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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND
MONTHLY RECORD OF GEOGRAPHY.



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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

A Journey to Southern Morocco and the Atlas Mountains.

By JOSEPH THOMSON.

(Read at the Evening Meeting, November 26th, 1888.)

Map, p. 61.*

THE idea of visiting Southern Morocco and the Atlas Mountains first dawned upon me in 1885. At that time I was engaged in a mission to the Central Soudan, and the infant civilisation which I there found flourishing made me desirous of studying its parent sources.

Chief among these was Morocco. For nearly nine centuries Moorish traders had continued to cross the Sahara to Timbuctu, Gandu, and Sokoto, and had left behind them the impress of their religion, arts, and industries.

But Morocco presented another and no less potent attraction. Though almost in touch with Europe, many parts of the Empire remained as completely unexplored as many districts in the heart of Africa.

The Romans had held sway over a considerable area in the north, and it is believed even sent an expedition across the Atlas, but all concerning their domination remains practically a lost chapter of history.

Later on the Arabs swept with an irresistible rush over the plains and lowlands, but to this day never got complete possession of the mountainous areas. But where Moorish armies could not penetrate, a celebrated Moorish traveller contrived to go, and till recent years, Leo Africanus remained the sole authority on the subject of Southern and Central Morocco and the Atlas Mountains.

The Portuguese had advanced their flag to the very foot of the Atlas,

* The map accompanying this paper is reduced from Mr. Thomson's field maps. The position of Morocco as given by Lieut. Washington has been adopted as a central station from which the mapping of the Atlas from Demnat to Imintanut has been done by triangulation with prismatic compass, corrected by observed latitudes at all the principal points. The altitudes are computed from numerous readings of the hypsometer, and from observations with the aneroid alone, rectified by those taken in conjunction with the boiling-point readings. The aneroid by itself proved to be absolutely worthless among the mountains, though on return to the coast it read nearly correct.

No. I.—JAN. 1889.]

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and unnumbered traders had looked upon the magnificent panorama of mountains, yet till the latter half of this century no European had entered the promising portals or ascended the snow-streaked summits. At least no one has left a reliable or detailed account of his having so done.

The first really serious attempt to follow in the footsteps of Leo was made in 1871 by Sir Joseph Hooker and his companion Mr. Ball, and the Society need not be told of the vast stores of botanical information they brought back with them, nor of the valuable light they shed upon the constitution of the great range in the short but well-spent time they devoted to their investigations.

Much—very much indeed—still remained to accomplish, however, to elucidate the geographical features and geological structure of the Atlas. Various attempts were made to break down the barrier of Moorish fanaticism, suspicion, and official obstruction, but with almost no result.

Lenz, in disguise, on his celebrated journey to Timbuctu, crossed one pass; and various other tourists and botanists made insignificant attempts to penetrate the glens or to ascend the lower mountain terraces. These, however, were mere scratches on the surface till in 1883 de Foucauld, disguised as a Jew, made his wonderful journey, which for extent and geographical interest far surpasses those of all previous travellers.

After passing through hitherto unexplored districts between Mequinez and Demnat, he crossed the Atlas by a new pass, mapped out much of the Anti-Atlas for the first time, recrossed into the valley of the Muluyu and regained Algeria safely, rendering it impossible for any future traveller to make such another brilliant contribution to our geographical knowledge of the north-western corner of Africa.

Though Sir Joseph Hooker and de Foucauld had thus enormously added to our knowledge of the botany and geography of Southern Morocco, yet the Atlas Mountains remained little more than outlined. Two ascents made and three crossings achieved still represented the work done in elucidating the geographical features of a range of mountains second to none in Europe or Africa in length and average elevation.

It will thus be seen that there was a wide field for my exploring instincts when I made up my mind in the beginning of this year to visit Morocco and the Moors. Unfortunately, the season of the year which I selected was not favourable for making natural history collections, considering the extreme heat and aridity of the Moorish summer.

Accompanied by a young friend, Mr. Harold Crichton-Browne, I left England on March 9th of this year.

At Tangiers we were cordially and encouragingly received by our able and energetic minister, Sir W. Kirby Green, who did his utmost to aid

us in our undertaking. We were here detained three weeks waiting for a letter from the Sultan, which, we hoped, would prove a passport to all parts of his dominions. The letter came; but while it was everything that could be desired for the lowlands and plains, it very frankly stated that we were not to be allowed to enter the mountains—the very places where we wanted to go. Not absolutely daunted by the prohibition, and relying on finding some way to evade His Sharifian Majesty's will, we left Tangiers by steamer for Casablanca on the 5th of April.

At the latter thriving town we secured the services of a Moor, and thus scantily attended we rode overland through the provinces of Shawia, Dukalla, and Abda to Mogador, where we arrived on the 17th.

As far as the river Tensift the country traversed may be described as a gently undulating upraised sea-bed, forming a low plateau or broad step, nowhere rising above 500 feet in elevation, and composed in great part of tertiary shell-sands. It is a supremely monotonous country, chiefly distinguished by its complete absence of trees and the scarcity of the population—the result of Moorish misgovernment. The traveller passes from areas ablaze with a gorgeous carpet of flowers to tracts of bush and palmetto, or he traverses rich plains of black loam, covered with splendid crops of barley and peas, alternating with fields left waste and desolate.

Only one stream, the Um er Rbia, finds its way through this region from the mountains.

With our arrival at the Tensift all this changes. We here enter the area affected by the uprising of the Atlas Mountains. The tertiary sea-bed disappears, and its place is taken by a more broken country, culminating in the Jebel Hadid or Iron Mountains, formed of cretaceous limestones and shales. Here also commences the area of Argan forest, that peculiar and useful oil tree which finds sustenance where the more water-loving olive cannot live.

The rich loamy plains of Abda and Dukalla become in Shiedma for the most part stone-strewn sterile tracts due to a crust formed by the cementing of the calcareous particles which compose the major part of the soil. This singular crust presents an adamantine surface to the husbandman and practically seals up the ground.

Our first view of the Atlas Mountains was obtained on our nearing our real starting-point. We had just left the plain of Akermut, near Jebel Hadid, and reached the crest of the low hills which here overlook the coast. Some miles in front of us we had observed with pleasure the gleaming white-washed houses of Mogador. As our gaze passed from the almost sea-girt town to the remarkable sand-dunes which embrace it on the east, and from the sand-dunes to the dark *Callitris*-clad hills behind, our attention was suddenly riveted by the sight of a bright crystal-like peak in the distant horizon. We knew at once that this was one of the higher elevations of the Atlas, and if the sight did nothing more, it gave

us keen pleasure at the moment, and further fired our desire to visit those mountain heights.

With our arrival at Mogador commenced the preparations for our excursion. In these we derived much advice and assistance from Mr. Payton, H.M. Consul, and also J. L. Ratto, agent for the steamers of the Messrs. Forwood. It was not till the 7th of May that we left Mogador with our little party of five men. As travelling in Morocco was a new experience to me and the Moorish character an unknown quantity, I judged it best not to plunge straight into the interior till I had satisfied myself to some extent on these points. For this purpose I determined to return to Saffi by a circuitous route through Shiedma.

It was well for me that I did so, for the few days devoted to the trip revealed such a state of things among my men as almost reduced me to the verge of despair. Their laziness, insolence, gluttony, and deceit were quite a revelation to me, and I speedily saw that the first essential to our successful progress was the settlement of the question who was the master. After a most unpleasant struggle this point was determined in our favour, but from first to last our own men were our worst enemies, while their laziness, intractable character, and persistent treachery not only poisoned all the pleasure of my journey, but time after time thwarted and upset my plans when promising most success.

Our tour through Shiedma calls for no detailed description. We first went E.S.E. over the wind-blown sand hills till reaching the top of a step or terrace we passed over an irregular rocky and scantily populated district, dark with Argan forest, though relieved in colour by the lighter green of waving genista. This led to a second step forming the plateau which stretches east to the Atlas and south to the still higher plateau of Haha.

From Makala, our first camp, we turned north to the Kasbah or castle of the kaid of Shiedma, over a painful stone-strewn and crust-bound country. From the Kasbah we veered round, descended to the lower plateau terrace and camped at the eastern foot of Jebel Hadid, or the Iron Mountains. We here devoted two days to the ascent of the mountains and the examination of the ancient iron workings. These mines we found to consist of a series of excavations on the top of the mountain in much broken rock, evidently the result of volcanic disturbance. In the fissures and cavities formed in the focus of eruption hot springs had probably deposited the hydrous oxides of iron which now fill them.

From Jebel Hadid we went to the Tensift, and after crossing with some difficulty and danger we reached Saffi on the following day.

Our first business on our arrival at Saffi was to break up the too-united family of Mogador men by the summary dismissal of two of their number and their replacement by two more reliable men recommended by Mr. Hunot, our clever Vice-Consul at Saffi, whose services to us cannot be too cordially acknowledged. This change proved to be a happy

one, as the new comers kept themselves apart, and would not join in the obstructive and treacherous tactics of the others, while in many cases warning us of their doings.

From Saffi we directed our steps to the city of Morocco on the 19th of May. The route leads over the raised sea-bed of Abda, till reaching the second step of the plateau we leave Abda behind and enter the province of Bled Hummel or the "Red Country," so called from the colour of its soils, the result of the denudation of the red and purple cretaceous shales which are here largely developed.

For mile after mile we ride over treeless plains of matchless fertility, though scantily populated, till on the second day we camp at the small salt lake of Zima. This sheet of water owes its salinity to the springs which seem to be a special characteristic of the purple shales, for wherever we found the latter in any great development, there also occurred salt springs.

From Lake Zima, Bled Hummel begins to belie its character of red, due to the appearance of grey friable clay slates and other metamorphic rocks. Almost co-terminous with the geological change, the level fertile plains give place to much denuded ranges of hills which form the greater part of the province of Rahamna, and give an air of sterile rugged picturesqueness to the scenery. These hills run parallel with the Atlas Mountains in extremely serrated ranges, till they disappear near the Um-er-Rbia. They form the northern boundary of the plain of Morocco, and are known as the Jebellet or Little Mountains to distinguish them from the Atlas range—here known as the Jebel—although sometimes named Jebel Tilj or snow mountain. On the fourth march we leave behind us the hills of Rahamna and enter the great plain of Morocco, the dried-up bed of some ancient lake. Here for the first time the Atlas range bursts upon the traveller in all its massive grandeur, as it rises abruptly from the plain, and passes by successive irregular terraces into one or two prominent snow-clad elevations, though in the main presenting an even sky line. After the first rapid survey of the extensive panorama and the cool snowy heights the eye gladly rests, after a hot day's ride, on the palm groves and dark green gardens, which encircle the city of Morocco, from the centre of which rises kingly the fine tower of the Kutubia, a silent but striking monument of Morocco's past greatness and its present decay and degeneracy.

With our arrival at the city of Morocco on the 21st of May the real difficulties of our trip commenced. We were now on the threshold of untrodden paths, and everything would depend on our method of attacking them.

Handicapped as we were with an interpreter we could not trust in the slightest, we had to be most cautious in our enquiries, as it was absolutely necessary to keep our men in the most perfect ignorance of

our real designs. And yet it was of paramount importance that we should have a fairly accurate knowledge of the routes we wanted to traverse before venturing near them, as it would be absolutely impossible to get it in their respective neighbourhoods.

All things considered, I thought it best to visit Demnat first, to throw the Viceroy and the kaids off the scent, as well as to get my men more into my power. Not to be hampered by spying and obstructive soldiers, I took French leave of the city on the 27th, and going straight east, reached the base of the mountains at the small ruinous town of Sidi Rehal.

At this time, clouds hung persistently about the flanks of the mountains, allowing us only occasional glimpses of the central axis, or its lower ranges. One interesting geological feature attracted my attention. This was the occurrence of a continuous boss or dyke of basalt, which marked the merging of the mountains in the plains, and, as subsequent investigation showed, extended from Demnat to the W. Nyfis, though at places masked by the limestones and shales through which it passed, and which form the mass of the lower ranges.

Words fail me to describe the charming valley in the centre of which the picturesque little town of Demnat stands. Probably in the whole length and breadth of the Atlas range there is not another spot to equal it in all the varied charms which go to make a landscape attractive.

We enter by a tortuous gorge clad with callitris and juniper trees, and lanes hedged in by a glorious profusion of wild rose, honeysuckle, bramble, and pomegranate, lead us into splendid groves of olive and vines, while step-like on the hill-sides terrace upon terrace displays a wealth of colour in bright hued flowers, squares of green grass, or crops of fast ripening barley. Irrigation channels spread themselves in a perfect network over the entire valley, everywhere spreading fertility and raising the pleasant sound of rushing water. In the centre of this beautiful valley, on a projecting spur of the mountain, and overlooking the stream far below, the town of Demnat stands enthroned—cooled, even in the depths of an African summer, by fresh breezes from the mountains beyond.

From Demnat we made two excursions into the lower mountain ranges.

The first led us up the picturesque valley. Here, some miles above the town where the fast narrowing valley seems to end we discovered the wonderful natural bridge-aqueduct of Iminifri.

On reaching this strange natural phenomenon we see what appears to be the mouth of an enormous cave, as its name denotes, from which rushes the Wad Demnat in boisterous torrent. From the precipice above, a second fine stream seems to spring from the rock, and falls down the side of the cave's mouth. On entering, we find ourselves under a magnificent arch hung with stalactites, with walls presenting all the aspect of clustered pillars. Pushing our way in, we soon discover that here is no

cave, but nothing more than an arch, springing at a height of over 100 feet from one side of a mountain gorge to the other. Leaving the cave, and struggling, not without difficulty and danger, to the top of the arch, we find it to be, not only a bridge utilised by the inhabitants, but an aqueduct; for the stream which appears to spring from the rock, is in reality conveyed from the opposite side of the gorge to the side on which it falls as a cascade, by means of this natural bridge.

The explanation of this interesting structure is, I think, sufficiently simple. It has been formed by the deposition of the lime held in solution by the water of the upper stream, which from falling as a cascade on the east side of the glen has been gradually pushed forward by the growth of tufa till the latter touched the opposite side and the bridge was complete.

The rocks around Iminifri have an added interest in being clad in masses of the gum *Euphorbium*—the only place in the mountains I have seen the species.

Above Iminifri we crossed a valley broken by numerous low hills, which coincided with anticlines of cretaceous limestone rocks, the hollows or synclines being formed of red shales and sandstones. The valley ended in the sharply tilted limestones rising abruptly into mountain masses 6000 to 7000 feet high. The most prominent of these peaks I ascended, and discovered the ruins of a so-called Christian church. These ruins are sufficiently remarkable both for their character and the position they occupy, but, in my opinion, they belong to a pre-Christian era.

This, our first exploration of the mountains, was done without the knowledge of the Kaid of Demnat. Not so the second, and we had our first struggle with Moorish officialism, backed by the underhand opposition of most of our men. We came off triumphant, however. The goal of our trip was Tasimset, a place south-west of Demnat. This proved to be a lovely and picturesque spot cradled among mountain heights. Here were magnificent groves of walnuts and pine-woods crowning various rocks and heights. Beautiful springs burst forth in great volume from the foot of precipices. Chief feature of all, however, was the fine waterfall, underneath which, cut out of the rock, was a remarkable series of artificial caves.

Ascending to the top of the precipice, over which the stream of Tasimset falls, we contrived, in spite of the unceasing opposition of our soldier, to reach the top of a peak 6000 feet in elevation, to be rewarded by an extensive and impressive landscape. Some thousand feet below lay the village of Tafrint with its green terraces, yellow patches of barley, and dark olive groves. Beyond, the river Tessaout, gathering numerous tributary streams from east and west, cut its way by a deep gorge through the numerous parallel escarped ranges of mountains which rose in ever increasing magnitude till they swept up in the culminating

central axis of the range. The aspect of the limestone escarpment which crowned the ridges, and the bright colour of the red and purple shales which occupied the hollows—the deep cutting of the Tessaout and the snowy table-topped masses which dominated all—made a scene of enthralling impressiveness.

From our point of vantage it was abundantly apparent to us that here the cretaceous rocks not only form the lower ranges, but also the central mass—a conclusion drawn at the time from the surface outlines, but, as we shall see, established by actual observation further west.

It was an occasion of no small anxiety to us when the day arrived for our leaving Demnat and starting for the point which we had selected for the first serious attempt to cross the mountains. To fail would be disastrous in every sense of the word. We knew only too well that the news of that failure would follow us everywhere and give a precedent on which other governors and sheiks would only too gladly act.

Happily, however, we had the altogether unexpected and singular good fortune to find at Demnat a Jewish interpreter who made us perfectly independent of the services of our men. On leaving Demnat on the 4th of June we ostensibly started for Sidi Rehal on our way to the city of Morocco. At a sheik's house called Tezert, an hour from Sidi Rehal, I pretended to be tired, and, as if on the spur of the moment, made up my mind to stop for the night. Our men were completely thrown off their guard, and I was left free to treat with the unsuspecting sheik uninfluenced by traitors in the camp. I simply told him that on the morrow I was going to visit his master, the Kaid of Glauwa, for whom I was charged with a letter from the Sultan. He naturally assumed that it was a special letter on government business, and was at once all anxiety to help us on our way. Needless to say I did not show him the letter or enlighten him as to its general character.

In the morning, hardly able to believe in our good luck, we started at dawn, our men full of wonderment at the unexpected direction we were taking. It was only when we were well into the mountains that the situation dawned upon them, and then their faces were a sight to see. Our way lay first west then south, over much denuded hills cut out of the basalt boss already alluded to. In a short time we reached the glens of the Lar and the Lemulha, cut through purple shales, the bright colours modified by patches of bush and grass.

At the village and market of Enzel we struck the Wad Gadat, up whose rugged glen our way now lay into the heart of the mountains. For over an hour we skitted great cliffs of red clays. Gradually the road became more difficult and dangerous, as we rounded the ends of deep ravines, skirted deep clay precipices where the track was reduced to a minimum, keeping us in a continual state of anxiety lest our mules went over. After five hours' travelling the clay cliffs gave place to red sandstone, with red and white shales interbedded. Along this track there

were no villages, and the sides of the glen were well clothed with callitris and juniper, and at places evergreen oak. Towards mid-day the glen became reduced to a mere gorge cut through compact sandstone. To pass this contraction we had to struggle up the mountain-side, over boulders, the mules' legs in constant danger as well as their riders' heads, though at places riding was out of the question.

Beyond the gorge lies the picturesque district of Zarktan. Here the Gadat divides and spreads itself in radiating tributaries on the northern face of the central range. The view was one of considerable grandeur, the radiating deep glens and wall-like dividing ridges merging southward in the snow-clad masses which form the backbone of the range. The lower slopes of the glens were smiling with bright green terraces and olive groves, while the ridges, with a ground colour of red and purple, were mottled with conifers and oak, and displayed on spurs and rocks the strangely built hamlets of the mountaineers.

From Zarktan our road to Glauwa zigzagged up a high narrow ridge, which brought us in several hours to the foot of the Atlas crest. Far below us, on our right, ran the Gadat, the gorge of the Asif Adrar n Iri flanked us on the left, while the bright-hued ridge we stood on led to the entrance of the gorge which ended in the pass across the mountains. Beneath and around us, the red-tinted soil and the mottling of forest threw a certain attraction over the splendid prospect of mountain, ridge, and glen, but in front and above us there was hardly a relieving feature to the grey barren ruggedness of the clay shales which formed the central crest.

Struggling up the gorge of the Adrar n Iri over horrid angular blocks for some time, we arrived late in the afternoon at the district of Titula, where the gorge expands, and ends in the very heart of the Atlas range. A more desolate prospect I have never seen, though it irresistibly reminded me of Aden, as I remarked the rusty-coloured sandstone and quartzites and the grey and black shales. Hardly a tree or bush was to be seen, only a little grass on the small irrigated terraces. In this grim region, resembling the extinct crater of a volcano, we camped.

On the following day we attacked the remaining section of the mountains, which incloses the valley to the south. We crossed numerous moraine heaps and piled-up boulders at the head of the glen, evidences of glacial action, which we afterwards saw in some other places, and along the streams and springs we noticed with pleasure the occurrence of buttercups, daisies, veronica, stellaria, and other home plants.

A sharp climb of an hour and a half on the morning of the 8th brought us to the top of the pass, the Tizi-n-Teluet, at a height of 8381 feet. A view of magnificent extent spread itself out before us. Southward the eye roamed far into the hazy distance over the basin of the Draa, and northward scanned the glen of Gadat, the plain of Morocco, and rested on the mountains of Rahamna and Srarna. Though impressive in its

extent, it was far from picturesque in form. We looked in vain for the Anti-Atlas. As far as the eye could reach we saw only a slightly broken plateau region, 7000 to 8000 feet in altitude, without a conspicuous feature to catch the eye. Even in colour it was mournful and monotonous in the extreme—a deadly grey, which spoke of friable shale and general barrenness, unrelieved by green forest or bush, was what imperceptibly blended with the haze of distance.

The one refreshing feature of this disappointing landscape was the little valley of Teluet, which lay 2500 feet below us, resembling the dried-up and grass-grown bed of a mountain lake, which, indeed, it may have been. On either side of the pass the mountains rose 2000 feet above us, like the rugged pillars of a gate.

In the valley of Teluet the kaid of Glauwa has his castle, and there we were hospitably entertained for several days, though the kaid's face was a study in expression on his reading our letter from the Sultan.

Time will not allow me to tell you of the three short trips to the neighbouring heights which we made, nor of the events which led to the failure of our plans to proceed west along the southern slope of the main chain. On our declaring our determination to go whether the kaid gave us permission or not, we were placed virtually in confinement in the castle. That there was some danger, however, in taking the route I wanted was made evident to me by a very unpleasant incident which occurred.

Accompanied by a Jew servant, I had contrived to escape from the castle, with the object of visiting a glen some miles to the west. I had almost reached my destination, and had passed a large village, when a tremendous commotion all at once arose, and in a few seconds I found myself in the centre of an excited crowd of armed mountaineers, all of them making threatening gestures, but two especially furiously attempting to extricate themselves from more peaceable companions, with the very evident object of shooting me. Deprecating gestures were not of much use at such a moment, and I was perforce compelled to turn back, earnestly wishing that I had a pair of eyes in the back of my head.

It was a very bitter moment for us when, finding our men faithless, and the kaid unmoved by threats or bribes, we recrossed on June 18th the Tizi-n-Teluet, and passed down the glen of the Gadat. Some distance south of Enzel we left the Gadat, and cut across the lower ranges which flank the mountains, reaching the Kasbah of Misfiwa in two big marches. Happily the kaid was absent, and we were able to get away from Misfiwa without any one, outside our own party, knowing how we had been turned back at Glauwa.

We judged it best, however, not to make any attempts at exploration in the neighbourhood.

In a single march of fourteen hours we went straight from Misfiwa to the Kasbah of Gurguri, arriving, early next day, at Amsmiz.

Once more we were fortunate in getting away to the mountains without opposition. Our object, this time, was to reach the small mountain province of Gindafy, and our route lay up the Wad Amsmiz. The appearance here presented by the lower ranges and central axis of the Atlas differs very much from those parts we had crossed. Here the outer steps or terraces rise abruptly 4000 feet above the plain, and consist of metamorphic slates, broken into by intrusive arms of porphyries. Such at least is the character of the eastern side of the Wad Amsmiz—the western side having a capping of compact limestones and sandstones—the straight lines of bedding and even surface being in marked contrast with the irregular and jagged outline of the metamorphic areas. We followed the Wad Amsmiz as far as Jebel Tezah—a conspicuous peak rather erroneously named, as Tezah or Tizi simply means pass or mountain. I retain the name, however, for convenience, as the peak in question has no more distinctive title. From Tezah the glen turns more to the southwest, becomes narrower, and more rugged, and, in a very few miles, ends abruptly. At this place the ascent of the central axis commences—a task which proved to be extremely arduous, and tried the strength of our lightly loaded mules. At mid-day on the 25th we succeeded in reaching the top of the Tizi Nemiri at an elevation of 9962 feet. Here a disappointment-awaited us. We had been led to believe that Gindafy's lay on the lower slopes of the south side, but now the deep gorge of the Wad Nyfis was pointed out as our destination. This river, after cutting by a narrow gorge right into the heart of the main axis, circles round, and runs parallel with the line of mountains, where it has scooped out for itself a long narrow valley, which forms the mountain fastness of Gindafy.

We had as little time to linger there as I have little time to linger now, over the features of this new mountain panorama, for we had far to go, and nasty mountain paths to traverse, before we reached the bed of the Nyfis, and the Kasbah of the kaid of Gindafy. Happily, though the track was the most dangerous we had yet traversed, we reached our destination safely, after making a descent of over 5000 feet.

One of the most remarkable features of this valley is the occurrence of a curious pocket of red sandstone, the beds lying almost vertically against the sides of the valley, looking as if a section of cretaceous rocks had been caught and squeezed between two folds of the range.

For the first two days we got on very well with the kaid and I was able to make a most delightful excursion up the Wad Agandice, a tributary of the Nyfis. The gorge which this stream has cut through the southern section of the main axis is, without exception, the grandest and most imposing sight I have seen in the Atlas Mountains. On either side crystalline limestones, and massive limestone and sandstone beds of a later era rose in a series of beetling cliffs leading up to jagged peaks and table-topped rocks 4000 feet overhead. The borders of the stream

gave a footing to an avenue of lentisk and ash, walnut and almond, while the savage ruggedness of the projecting rocks and broken precipices was toned down by groups of dark callitris and evergreen oak.

At a point where this gorge divides I was able to make an ascent, though prevented from going where I desired by a soldier guide whom I did not want to irritate.

Thanks to the intervention of some of our men, the kaid now became exceedingly suspicious of us, and confined us to our tents, from which we were not allowed to go. We spent a couple of days vainly attempting to get in communication with him, and we were compelled reluctantly to strike our camp and return to the plains. We were, happily, able to return by the gorge of the Nyfis, though we cut across a corner of the lower ranges and reached Amsmiz safely on the 4th of July.

On crossing the Tizi Nemiri and while camped at Gindafy, we had seen a very conspicuous snow-clad peak to the west and a great desire to ascend it had taken possession of me, as it was evidently the highest point between the Wad Nyfis and the Atlantic.

My friend, Mr. Crichton-Browne, was at this time suffering from the effects of a scorpion sting, so that he had to be left behind. To throw the kaid of Amsmiz off the scent, I pretended I only wanted to make a visit to Marossa, a small province at the head of the Asif el Mel. Taking with me only three men and a soldier guide, I went west on the 6th to the stream named and reached Marossa on the same day. From Marossa I turned east, skirting the base of the main axis to Erduz ostensibly on the way back to Amsmiz, beyond which the soldier had orders not to allow us to go. But I snapped my fingers at the kaid's order, and in spite of entreaties and threats I took the matter in my own hand and started for the district of Ogdimt at the foot of the peak. Even the most faithful of my three men were in a terrible fright at having to venture into a more than semi-independent district. The third, who was at once my cook, servant, and interpreter, tried all the evil machinations his deceitful Moorish brain could devise to stop me and get me into trouble. But I was not to be turned from my purpose, and for the fourth time I was successful in crossing the mountains, and reaching my destination. I shall not take up your time recounting the critical situation I was placed in or how the ascent of the peak developed into a race, in which I was chased by natives and had more than one narrow escape of being shot. Suffice it for the Geographical Society to know that I did reach the top, though quite exhausted by my exertions. It took me some time to recover sufficiently to take my observation and scan the scene. And the prospect displayed sufficiently repaid me. From my point of vantage, 12,734 feet above the sea, I looked down and around as on a great map spread out before me.

Ten thousand feet below, the river Sus could be seen in glittering reaches winding seaward through the grove and field mottled valley,

gathering within its banks a score of streams from the mountains. Immediately to the south lay Ras el Wad, and my faithful Jew, proud of his knowledge of the country, pointed out a score of places. Chiefly, however, was I attracted by the sight of the massive elevation of the Anti-Atlas, whose table-like top formed an almost straight line on the horizon. East, west, and north a bewildering assemblage of snow-streaked peaks, sharp barren ridges, gorges, and glens, rocky and desolate above, grove fringed and terraced below, met the eye, making description in the limits assigned me impossible.

Not daring to return by the same route by which I came, I passed round the head of the glen of the Nyfis and arrived in camp with my devoted and only follower. On the following day we recrossed the mountains by a new route, and regained Amsmiz on the 11th.

On the 13th of July we re-entered the city of Morocco. It had been our intention to remain only a fortnight, but a variety of unforeseen causes lengthened our stay to six weeks. The time, however, was not spent unprofitably. The unparalleled misgovernment and official corruption which exist, and various interesting problems, social and religious, give us much to think about. Nothing, however, appeared more remarkable to us than the exceptionally favourable position the town Jews hold in the country as compared with the ruling race. Though alien and despised, they are the only people whose lives and property are safe. And yet among Jews the Moorish type is the filthiest, the most unscrupulous and despicable. As a race of money-lenders they are maggots feeding on and aggravating the terrible sores of the country, while the oppressed Moors, between them and the Government, are between the devil and the deep sea.

During our stay in the city the temperature was exceedingly high, generally rising in the shade during the day from 100° to 112° F., and seldom descending much below 70°. Dust-storms from the desert were not infrequent, and produced a suffocating effect.

Our stay in Morocco was somewhat enlivened by the Aid Kebir or Great Holidays. On the opening day we got a terrible stoning, and narrowly escaped with our lives.

On the 27th of August we finally left the town. We had long noticed a prominent peak, the Miltzin of Lieut. Washington, at the head of the Wads Misfiwa and Urika, and I determined if possible to ascend it. For this purpose we went straight to Urika. We got a few miles up the glen and then were stopped by a cordon of armed mountaineers who, with threatening gestures, drove us back.

From Urika we rode to Asni in Reraya. Here Hooker had preceded us. Beyond Asni the Wad Reraya divides. Sir Joseph Hooker had explored the Wad Ait Mesan or western branch, and ascended the Tizi n Tagherot; we resolved to take the eastern or Wad Iminnen. With the usual amount of trouble we overcame the opposition of the sheik, and

succeeded in reaching the head of the well-populated but terribly bleak and rocky glen. At Tashdirt, the highest village, we ascended the main axis and reached the Tizi Likumpt on the 3rd September at a height of 13,151 feet. Rather to our surprise we found before us a branch of the Urika river penetrating into and running parallel to the central axis.

Looking W.S.W., we were much struck by an imposing peak called Tamjurt, which dominated the entire range, over which it towered 1500 to 2000 feet. This, in my opinion, will prove to be the highest peak in the entire range of the Atlas.

If I had had some good men on whom I could depend I would have attempted the ascent of Tamjurt, but so heartily sick had I become, acting the slave driver with my followers, of for ever being on the watch against their evil machinations, as well as the continual struggle with Moorish officialism, and the necessity of meeting obstruction with stratagems and bullying, that I could only wish to have done with the trip as soon as possible. I therefore turned my back on the most tempting part of the whole range and returned to Asni. On the following day we crossed the mountain spur of Gurguri and reached Amsmiz. We now skirted the base of the mountains through Mzuda to Duerani and the Wad Kehira, where we left the plains of Morocco.

At Imintanut, which we reached on the 8th, we found the whole country in a dangerous condition of warfare over the election of a new kaid of Mtuga. Between the death of one kaid and the assumption of power by a second, law and order are suspended, as it is a standing rule that no action can be taken on whatever happens in the interval.

In the case of Mtuga, two factions had fallen foul of each other and we heard of nothing but bloodshed and robbery.

These were not encouraging conditions for making a final attempt to cross the mountains and enter the dreaded country of Sous, the special bugbear of our cowardly men.

On the 9th of September we started on our hazardous trip. The Wad Imintanut emerges from the mountains by a very narrow gorge caused by the occurrence of an almost vertical bed of compact limestone. Inside, the rocks are more friable, and the gorge expands into a short glen which divides into three. One of these coming from the west formed by an escarpmented low range of cretaceous hills on the north, and a higher, more irregular range of metamorphic rocks on the south, we followed.

In two hours we left this glen and turned south into another, that of the Wad Msira. Crossing this depression we rose rapidly for half an hour, and then, at an elevation of only 4757 feet, we found ourselves at the top of the pass which leads into a tributary of the Sus. On our left the mountains rose bush-clad and composed of metamorphic rock, to an estimated height of 6000 feet, while on our right the hills or escarpment of the Mtuga and Haha plateau rose only some hundred feet

above us, beds of sandstone projecting in straight lines from its sides, red and barren.

The impression that we acquired at this pass or watershed, that we were skirting the end of the Atlas as a range, and that westward lay only a broad plateau cut off geologically and topographically from the range to the east, was only deepened as we travelled south. Our course lay S.S.W., over a desolate rocky depression which gradually widened till the glen became a valley characterised by curious flat-top mounds of friable red shales and river drift. Here we came once more upon the Argan. At midday we passed some very remarkable ruins. From this point the country presented a less sterile aspect. The glaring red soils and rocks were better clad with argan and almond, a few miserable fields appeared, and near these some small hamlets. The imposing masses of Ida M'hamud and Ida Uziki hitherto hid in haze, appeared to view, rising to a height of from 8000 to 10,000 feet, but sinking rapidly westward. At sunset, after having travelled over about forty miles as fast as our mules could go, we camped at the foot of Ida Uziki. Fearing a night attack we fortified ourselves as best we could, and remained on the outlook all night. Happily we were left unmolested, and on the following morning resumed our march with all celerity, as we were still in the heart of the disturbed districts.

We now struck away from the direct road which passes over the Ida Uziki mountain and the pass of Bibawan to Tarudant.

We traced out the tail of the Atlas range and remarked the manner in which the cretaceous sandstones are thrown up on the flanks of the range, though comparatively undisturbed away from the immediate line of upheaval.

At the Zawia of the Asif Ig we were out of the area of local quarrels and within sight of the Sus plain. Here also, I was satisfied in my own mind, was the most westerly extension of the Atlas range properly so called.

In passing from Mtuga to Sus we found we had jumped from the frying-pan into the fire, for the whole country proved to be in a state of ferment. The Howara Arabs were out in revolt and plundering right and left. At Mskorod, just a few hours before our arrival, a descent had been made; and it would have gone hard with us if we had been caught. We hurried, as fast as our jaded animals would permit, to the protection of the Kasbah of the kaid of Mgina. We found it filled with soldiers in daily expectation of a siege. Happily that did not take place, and we succeeded in escaping safely to Agadir next day. After a day's rest we resumed our march along the coast, and on the 17th of September we reached Mogador.

After resting a few days and discharging our treacherous followers, we started for Fez, where we hoped to do a little more exploring. This plan, however, came to nothing, as a despatch which I received stopped

me at Casablanca. When I tell you that that despatch called me to the relief of Emin Pasha, all true born British men and women will agree with me that I was justified in throwing all other considerations aside and returning home without a day's delay.

After the paper,

Sir FRANCIS DE WINTON said he had travelled in the country described in the paper and had great pleasure in bearing testimony not only to the great ability and patience which Mr. Thomson had displayed, but also to the value of the information he had collected. In 1874 he (Sir Francis de Winton) accompanied Sir John Drummond Hay on one of his diplomatic missions to Morocco, staying in the country six weeks. He went up the valley which Mr. Thomson had mentioned, and some of the party encamped there three weeks. That was in the month of April. The rivers could then be almost stepped across in the mornings, but in the evenings they were sufficiently deep to drown a man, in consequence of the melting of the snow during the heat of the day. The valley was of extreme fertility. It was only the misgovernment of the country which prevented its being almost the garden of the world. The journey from Mogador to England could be accomplished in three days and a half by quick steamers. The whole of the territory along the coast line would be most productive if properly cultivated. The Jews in Morocco were a very interesting race, but they were, without exception, the dirtiest people he had ever seen. The Jews' quarter in the city of Morocco was a place into which if a visitor went he would quickly want to get out again. The Jews, however, really conducted the business of the country. Their great object was to get money and at the same time to appear poor, because the moment they seemed to be rich they were "squeezed," and their money taken from them, often under great cruelty and injustice. Mr. Thomson had alluded to his return to England for the purpose of conducting an expedition of relief to Emin Pasha. All honour was due to him for the promptitude with which he responded to the call of duty. At the time the message was sent to him it was intended that he should proceed under the new East African Company who had taken up the tract of country north of Zanzibar, under British influence; but in consequence of the German attempt at colonising, great excitement throughout the whole of that section of country had been produced in the native mind against any attempts of whites to govern there. The managing director of the English Company, Mr. Mackenzie, who went out there about three months ago, had, however, by great tact, been enabled till now to avoid any outbreak in and around the port of Mombasa under the British Protectorate. He thought it would be agreed that the directors pursued a wise course when they declined to put other white men's lives in danger, even for the purpose of relieving Emin Pasha and Stanley, until the excitement had somewhat abated.

Mr. W. B. HARRIS said that he accompanied the British Minister to Morocco city last year, and from there made a short trip to the Atlas Mountains. He followed the Amsmiz valley a little way; on the left hand of this valley he entered a smaller valley, in which a river issued from a hole in the rock at the foot of a precipice. The natives call the spot "The well of the Christians," and assert that by some secret means the river can be shut off, and a treasure house, full of treasure, be discovered. Near Afn Tarsil there are some remarkable Troglodyte caves. Sir Joseph Hooker saw them, but was prevented from exploring them by the native authorities. Mr. White (H.M. Consul at Tangier), Lieut. Boulnois, R.A., and Mr. Harris entered some. The walls were rough, but the floors and ceilings well cut. How the original

inhabitants succeeded in reaching these caves is a mystery, as many are situated at a great height from the valley. Those the party were able to enter were rendered accessible by landslips. The existence of these caves is mentioned by Hanno in the *Periplus*. To explore them ladders and ropes would be necessary, but he did not believe that any exploration would be allowed by the authorities. The caves show greater signs of civilisation amongst the Troglodytes than one is led to believe by Hanno's account.

Sir RAWSON W. RAWSON congratulated Mr. Thomson upon his safe return from Morocco. The paper had mentioned but a few of the difficulties he had experienced in the exploration. The journey was undertaken on Mr. Thomson's own account, though the Royal Geographical Society contributed slightly towards the expense. His exploring instincts, which it was to be hoped would long be employed in the interests of science, geography, and humanity, led him, after his previous expeditions in other parts of Africa, to attempt the arduous journey to the Atlas Mountains. He was told that he was never likely to reach even the base of the mountains, unless it was as a prisoner, but he determined to proceed. After reaching the mountains once he was driven back to Morocco, where he was stoned, and narrowly escaped with his life. Fortunately he was not struck on the head or any vital part, but he was black and blue all over. On another occasion he was shot at in the mountains; but his courage, and the moral power which he possessed, not only over himself, but other men, enabled him to surmount all his difficulties and to return to England to give a description of parts of the Atlas Mountains which he was the first to visit. A better map than his was not likely to be obtained for some time to come, because the shifts and devices by which he was able to carry out his explorations were now known to the authorities. If it were his good fortune—a fortune sought by himself—to go to the relief of Emin Pasha, the Society would wish him God speed. He was the only traveller who with the sole object of contributing to the knowledge of geography had entered Africa from three sides of the continent. He had penetrated Africa five times. First he accompanied Keith Johnston, when the Expedition Committee of the Society were somewhat doubtful as to whether it was advisable to engage so young a man; but when Keith Johnston fell a victim, Mr. Thomson, who was not of age at the time, boldly took charge of the expedition, and succeeded in obtaining information about a new line of country by which it might be possible to penetrate Africa. His second journey was up the Rovuma, under the auspices of the Sultan of Zanzibar. Next he penetrated through the Masai country to the northern shores of Victoria Nyanza. From the western coast he went up the Niger, and striking eastward reached the South Sudan. His last journey was from the Mediterranean to the Atlas Mountains, and he was burning with a wish to again enter from the east and reach Wadelai, for the relief, if necessary, of Emin Pasha, or, at all events, to increase the geographical knowledge of the country and extend British influence. For so young a man no traveller had done so much, or more deserved the thanks of the Society. He had not failed in any one of his expeditions, nor had he been the cause of a single man's death. After ten years' hard work he was still eager to avail himself of any opportunity to extend geographical knowledge.

The CHAIRMAN (General Sir Beauchamp Walker), in offering the thanks of the Society to Mr. Thomson, said that none of that gentleman's expeditions had been accompanied by anything like violence towards those who travelled with him. That fact redounded very highly to Mr. Thomson's credit.

A Visit to Sheshouan. By WALTER B. HARRIS.

AT 2 a.m. on Friday, 13th of July, of this year, I left Tangier in the disguise of a Moor, accompanied by an Arab boy, both of us mounted on pack-mules, for the purpose of visiting Sheshouan, a town of fanatical Berbers, situated on the borders of the Riff country some sixty miles south of Tetuan.

Ten hours after leaving Tangier we arrived at Tetuan, where we made a halt for the night, putting up at a native fondak, or caravanserai, full of mules and vermin. My disguise consisted of the costume of a middle class Moor, and I wore the white-hooded jelaba, or cloak, which takes the place of the haik amongst the richer classes, and is usually worn in colours by the poorer. My legs and arms, which were bare, were slightly stained.

Unfortunately my knowledge of Arabic was not nearly sufficient to allow me to speak before natives without instant discovery, so I was unable to find out a great many facts about the country which I might have done had my pronunciation allowed me to converse with the inhabitants. My guide spoke no other language but Arabic.

Our baggage was not bulky, consisting as it did of a saucepan, a little green tea and sugar, and a blanket, while I wore a native leather bag round my neck containing a revolver and twenty-five rounds of ammunition, some paper and pencils, a penknife and cigarettes.

Early on the morning after our arrival at Tetuan we set out, and having crossed the Tetuan river a little to the south of the town, followed its course for some time. The road soon began a steep ascent, and by sunrise, an hour and a half after leaving Tetuan, we were some hundred feet above the valley, passing through the village of Zenat, perched upon a point on the mountain which commands both the Zenat and Tetuan valleys. The road here ran almost directly due south, which direction it followed, with little exception, as far as Sheshouan. The village of Zenat is the last spot on the road to which Christians are allowed to proceed, and even then there is risk. The village is of some size, and differing considerably from the villages in the Maghreb and other country districts, as here the houses are of "tabbia," painted white, with tiled roofs and walled-in gardens. There is abundance of water, which falls on every side from the rocks above in tiny cascades, the banks of which are overgrown with maiden-hair fern.

After leaving Zenat, at half-hour intervals we passed through two smaller villages, and then the road descended precipitously to the valley beneath, till it reached the river's edge. Almost opposite the point where the road meets the river is the valley that leads to Moulai Absalam, a mountain of the Beni Hassan range, on which is a shrine, most holy in the Mahommedan eyes, and never, I believe, as yet visited by Christians. Here the road crossed the river, and we entered much wilder

country. Up till now the country had been tolerably well cultivated, but here we saw before us nothing but mountains, the lower parts covered with scrub, arbutus, and the palmeto, while the summits were either thick with forests, or of bare, cold grey rock.

Half an hour later we passed a ruined fondak and entered the country of the Beni-Hassani. We had been continually passing natives on the road, and I had up till now, as far as I could judge, escaped suspicion, but soon after leaving this fondak I was suddenly assailed on my mule by two Beni-Hassan men. My Arab boy here first showed the signs of pluck and 'cuteness which distinguished him all through my trip, and never losing his head for a moment, hurled at my assailants' heads such a string of polite epithets, that they stood back aghast. He then continued with a long tale of how I was a Moor from Fez, the son of one Abdul Malek, which apparently satisfied them, and we were allowed to pass. A slight bend in the hill having hidden us from their sight, we pushed on as fast as our mules could go. Shortly after this episode I perceived in the distance men following us—running towards us at a considerable pace. I at once pushed forward and attempted to conceal myself and mules in the oleanders by the river. We were soon overtaken and brought out, but the men were very quiet and attempted no violence, merely telling us to return at once by the road we had come. This I refused, of course, to do, telling them I was on my way to Sheshouan, for it was no longer possible to deny I was a Christian. Finding their oft-repeated threats and warnings futile, they allowed me to continue my route. I was completely taken in by their change of tactics, and it was not till next day that I discovered that it was merely a trick to make sure of catching me further in—in fact, in Sheshouan itself.

The road again ascended from this point, the country being, for the most part, grass land, and, in places, slightly cultivated. For the next four hours we were crossing the watershed which exists, and is ignored in nearly all maps, between the Zenat and Sheshouan valleys. The watershed is at a considerable elevation above the two valleys, the ascent on the north side being gradual, while on the south it is almost precipitous. Very few trees exist in these parts, though, here and there, an olive gave shelter to a group of sleeping natives who were spending the hot part of the afternoon in "siestas." The watershed does not, of course, rise nearly to the height of the mountains on either side, and is really only an elevation in the valley that divides it into two parts, the river flowing from it respectively north and south. Having crossed this open country and reached a spot where the small streams began to flow to the south, the road turns to the left, and following the side of a hill for a time, descends to the valley. At the bottom we crossed the river twice. In spite of its being July, and the driest season, the Gomara river was tolerably full of water, and, at places, two or three feet in depth. The water is beautifully clear, and runs at a great pace. This river receives

a little higher up, the waters of Sheshouan, and then flows in an easterly direction through the Gomara district, emptying itself into the Mediterranean about 15 miles south-east of Tetuan.

Evening was coming on when we commenced ascending, through wild country and over a terribly stony path, the lower slopes of the Sheshouan mountain. With the exception of some of the valleys of the Great Atlas, this was the finest scenery I have seen in Morocco. The mountain of Sheshouan itself is of great height, according to de Foucauld, who was the first European to visit Sheshouan, and whose book on Morocco is by far the most correct; it reaches an elevation of over 7000 feet. The summit—in fact, the whole mountain above Sheshouan—is of bare limestone rock, with precipitous sides. It was much to my regret that I was not able to take instruments for ascertaining with certainty the angles and elevations, but the difficulty of finding such things in Tangier, and the suspicion that might be aroused by one's borrowing them from the European authorities, who would assuredly veto one's attempting to reach Sheshouan, and again the risk of such things being found on one if a search were instituted by the natives, necessitated my having to go without them, so that the only thing I had to help me in my work was an ordinary compass.

Half an hour after sunset we reached Sheshouan, after sixteen hours on mule-back. One does not see the town till one is close upon it—in fact, till one is in the market-place that adjoins it. We crossed this *sôko* at a trot, and passing through the Bab-al-Sôk, the principal gate of the town, we proceeded down several hilly streets, and stopped before the house of my Arab boy's father, and entered. His parents were not at all pleased to see me, as the idea of harbouring a Christian was entirely repugnant to their feelings, and besides, the risk to themselves was very great. This fear of being detected sheltering a Christian, together with a promise of money at my departure, at last reconciled them to concealing me. An hour's rest, and I sallied out to view the town.

Sheshouan is a walled town, possessing seven mosques and five gates. In size it covers more ground than Tangier, though probably its inhabitants do not number more than eight or ten thousand, and Foucault gives it at considerably less; but I made what inquiries I could on this matter, and believe my estimate to be the more correct. The town boasts a gorgeous situation, being built on a ledge of rock high above the valley, which here shows signs of excellent cultivation, while a precipice of rock rises some 2000 feet or more to the summit of the mountain above.

Down this precipice rush three waterfalls that issue from a cave far above. The water is intensely cold, and the Moors themselves have a saying—"So cold are the waters of Sheshouan that to taste them nearly knocks one's teeth down one's throat." However, the sensation was to me (a weary traveller) far more pleasant.

Great use is made of this water by the Sheshouani, for it is carried

by aqueducts to the gardens and houses below, *en route* turning many a mill-wheel. These mills grind the corn that is grown in the valley beneath, and are a source of great industry to the place. A bridge of good solid masonry spans the river just below the falls. The houses are built of *tabbia*, and are square in shape, built round a *patio*. They are for the most part of two stories, and seem in good repair. The house in which I was hiding was of this class, and of considerable size, the *patio* being able to easily contain our mules, and several goats, too, wandered about and spent their lives in it. The most curious characteristics of the town are the red-tile roofs, not found anywhere else in the country except in a few cases at Wazan and Alcazar-al-Kebir. The streets are paved with rough stones as at Tangier, while gutters exist in which there is a constant supply of fresh water.

The men are of small stature, wirily built. They wear the brown mountaineer's *jelaba*, and on their heads either their red cloth gun-covers à la turban, or a series of strings of goat or camel's hair.

The women's dress is similar to that of the other parts of the country, with the exception of black slippers instead of the red. This is a curious fact, as black slippers are worn in parts of Algeria also, though I believe Sheshouan to be the only place in Morocco in which they are to be found.

There is a small *mellah* or Jews' quarter in the place, but only certain Jews are allowed to go to the town at all, and they must wear a badge to show that they are "protected" by some Moor within the walls. This badge often consists of a handkerchief or some article of dress belonging to their "protector." The inhabitants are, nearly without exception, *Shorfa*, or descendants of the Prophet, whence perhaps their extraordinary fanaticism, as otherwise it seems incredible that a more or less flourishing community should by unanimous consent make death the punishment to any Christian who might visit them. The more curious is it that they are in a state of greater civilisation, with their bridge, aqueducts, and superior houses, than many of the easily accessible Moorish towns.

The place contains acres of gardens in which much fruit is grown. It is justly celebrated for the quality and quantity of the fruit, and the pears I ate there were finer than any I have tasted in the country. No doubt the elevation tends towards this, and the constant supply of water.

In the house in which I was, I noticed three large baskets of silk-worm cocoons, and no doubt the cultivation of the silkworm is carried on to some extent, owing principally to the great number of mulberry trees. I returned to the house shortly before dawn, and all next day lay in hiding.

Towards evening I began to make preparations for my return, intending to leave the town in the disguise of a woman, while my mules

proceeded by another route, but an unforeseen event happened which prevented this. The very Beni Hassan-men who had accosted me arrived in Sheshouan, and passed the word of the presence of a Christian. On hearing this I abandoned the female disguise, and dressing myself in mountaineer's costume, sallied forth. The town was in a state of some excitement, but I managed to escape undetected; and on foot, with my Arab boy and a friend of his, made for a village in which the friend lived, some five hours distant. With bleeding feet and ankles I arrived there before two o'clock in the morning, and was kindly treated by my boy's friend, who took me to his house, where my ankles were bathed and I ate some supper. Next morning, on waking, I found the mules had arrived, brought out from Sheshouan by a youth, who of course was unaware they belonged to a Christian.

All day I lay hiding, and at sunset was about to start off when somehow the suspicions of the natives were aroused, and it was too unsafe, owing to the brilliancy of the moon, to make a start. At the setting of the moon at twelve o'clock I crept out of the village, and was joined half an hour later by the mules. Thirteen hours later I arrived in Tetuan.

Sheshouan does not acknowledge the authority of the Sultan, and on his Majesty sending a governor there some time since, his Excellency was assassinated shortly after his arrival. I asked my friend at the village what kind of a government they possessed in Sheshouan; he replied, "There is only one governor here, and that is the gun." Whether the Sultan, after his visit to Tangier, will turn aside and punish Sheshouan for its many acts of insubordination, remains to be seen.

Two more characteristics of the place are the use of a straight long knife instead of the ordinary curved *coumieh* and a curious make of pottery, of which I was able to bring away an excellent antique example.

Some considerable trade is done in wood from the mountains round, which is taken on donkeys to Tetuan and there sold.

The "road" between Tetuan and Sheshouan is a mere mountain path, but in most places in tolerable repair.

Though I am not the first European who has entered Sheshouan—de Foucauld having been before me—yet I have made the longest stay there, and though there is really not a great deal of interest in the place, I do not regret the risk I ran in visiting it.

A Journey from British Honduras to Santa Cruz, Yucatan.

By WILLIAM MILLER, Assistant Surveyor-General, British Honduras.

IN January last I made an excursion from British Honduras into Yucatan territory as far as Santa Cruz, and it may interest the Society to receive an account of the journey and of the corrections required to be made on this portion of the maps of Yucatan.

The whole of the south-western portion of Yucatan is now in possession of the Santa Cruz Indians, who drove out the Spanish population about fifty years ago. At that time the whole of the country was peopled by the Spaniards of Yucatan (Mexico), and all this district must have been in a thriving and populous condition, as the ruins of well-built stone houses are now to be seen at intervals along the whole road from Bacalar to Santa Cruz, and according to the map,* numerous towns and villages existed, which are not now to be found.

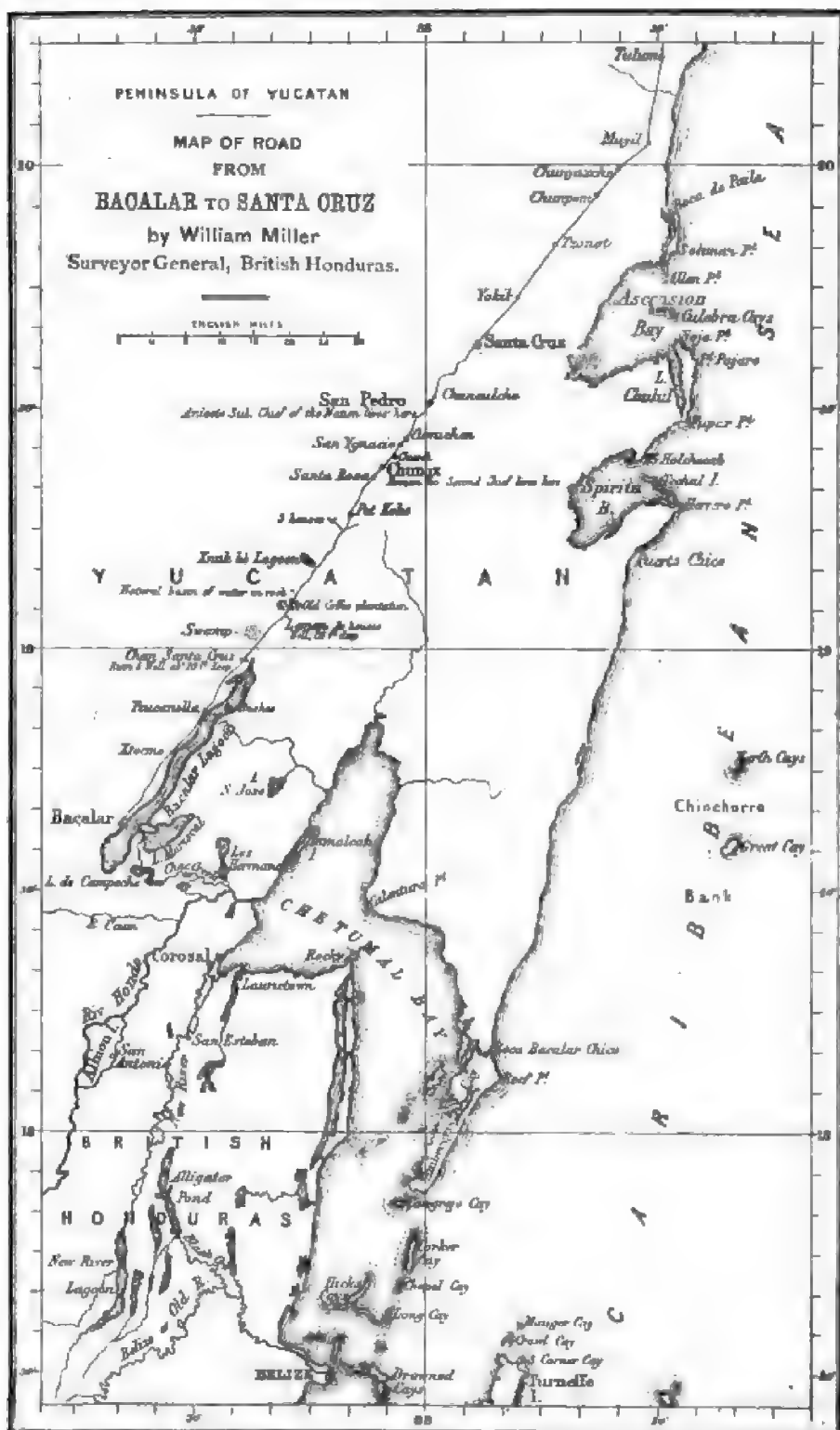
Bacalar is well known to the colonist of British Honduras, and several inhabitants of Corosal have been there, but so far as I can ascertain only two other Englishmen besides myself have been to Santa Cruz. I do not think it would be possible for a white man of any other nationality to go there. The Santa Cruz Indians have a very bad name and there are a good many murders recorded against them, which cause people to be very careful about going into their country. Small parties of these Indians occasionally come so far as Belize, but they are very little known there.

I proceeded in a dory from Corosal by sea to the river Hondo, and about 16 miles from the mouth came to Chao Creek, which runs from Bacalar Lagoon.

I was accompanied by three negroes of Corosal, and reached Bacalar town the second day after starting. This place must at one time have been a very fine town. It extends along the lagoon for about two English miles, and is about one mile broad. The streets are perfectly straight, and are laid out at right angles to each other. All the houses are built of stone covered with cement both outside and inside, which cement is ornamented with coloured designs. The old church is a very fine structure about 200 feet long, and the roof is an arch from end to end. The side walls are carried up to form a parapet hiding the outside of the roof from the streets. Over the entrance-door are spaces left for nine bells, but the bells have been removed by the Indians. I saw four of them in Santa Cruz town. The largest was about two feet six inches across, and bore the inscription, "Felix Lopez me fecit 1730."

There are numbers of human bones in the church, and from their

* 'Mapa de la Peninsula de Yucatan, . . . compilado por Joaquin Hübbe y Andreas Azuar Perez y revisado y aumentado con datos importantes por C. Hermann Berendt, 1878.'



position they were evidently not those of persons buried in the church, as some are in the corners of the chancel, whilst two small chapels at the side of the church have heaps of bones in them. There is not one complete skeleton, all being mixed up together. I was told that when the Indians revolted and were attacking the town many people ran to the church for protection, and were killed just where the bones now lie.

A stone fort overlooks the lagoon. This fort is surrounded by a ditch about 12 feet deep, having perpendicular walls, and some of the cannon now lie in the ditch. The whole town, except on the lagoon side, is surrounded by a stone wall; and taking all these things into consideration, it seems impossible to believe that the wretched Indians could turn out even a small white population in possession of the town. The streets are now nearly all overgrown with bush, and the houses are falling to decay.

No one lives in the town but an Indian guard of about sixty men, which is changed once every two months. They do not live in the old houses, but prefer to build their own stick-and-leaf huts in the gardens and other open spaces.

So soon as I arrived here I called on the Commandante in charge of the guard and told him that I wished to go up to Santa Cruz. He replied that there was no objection, and sent a guard of four soldiers, who remained with me all the way.

The sketch of the route made by me differs in several things from the map referred to. The Indians have a village on Bacalar Lagoon called Xtoomo. This is shown on the map as being upon the eastern side of the lagoon, whereas it should be upon the western side. There is no village at all upon the eastern side of the lagoon. An island is omitted from the map at the northern end of the lagoon, and the village near that point marked on the map as S^a Cruz is now known as Chan Santa Cruz. It is only marked now by a well and the ruins of a stone house. The large town marked on the map as Chan Santacruz is now known as simply Santa Cruz, and is the centre of the Indian country and their capital. The range of high hills shown on the map does not exist.

The entire country along which the road passes from Bacalar to Santa Cruz is flat and covered with high bush. Near Bacalar lagoon it is swampy, but the remainder of the distance is hard dry ground and very stony. In some parts the road goes over places where the rock formation has been thrust upwards, forming hillocks 20 to 30 feet high covered with sharp points. These make travelling tiring work, as the soles of the feet soon become tender, but otherwise the road is very good and kept clear of bush by the Indians for a width of about eight feet, and it would be possible to ride on horseback all the way.

The distances given on the map do not agree with the distances

given by the Indians. I had no instruments, and so had to accept the Indians' version of the number of leagues travelled.

It would not be safe to use any surveying or astronomical instruments there, as the people are constantly in dread of and watching for spies. I inquired how they judged the distances, and they replied that when the Yucatecans were in possession of the country the roads were measured, and every league marked by a cross, the positions of which they know. No doubt the turns of the road would increase the distance shown upon the map to a considerable extent. The Indians now keep crosses every few miles—simply a stick propped up with stones and another tied across it near the top. Many of these crosses have rough roofs of leaf constructed over them.

When the time came to leave the dorey and start up country, I had some difficulty with the men whom I had brought from Corosal, as they feared to go to the town of Santa Cruz.

The journey from Bacalar to Santa Cruz takes the Indians five days, but on occasions of alarm they have marched a thousand men from Santa Cruz to Bacalar within three days. I found it hard work to perform the journey in six days. Two nights have to be passed in the bush, but after that villages can be made convenient halting-places.

Every village has its church, and it is the custom to lodge in them when travelling. They are merely leaf roofs with walls of stick carried only half-way up to the roof. At one end a table is placed for an altar, on which are twelve or fifteen crosses. On arriving at one of these the Indians take off their hats and bow to the crosses; but although professing to be Christians, I do not think they understand much about the Christian faith. They have no priests, but remember a few prayers taught them by the Spaniards, and these they sometimes chant before their altars. None of them have any idea of reading or writing.

Near Tulum is a particular cross, from which the Indians say the voice of God issues, and on all grave occasions this cross is consulted and they act in accordance with the directions given by the voice which issues from the cross. All the chiefs of the nation are appointed by it. A few years ago a Yucatecan priest went by sea to Tulum. He was taken before this cross and interrogated, when the cross directed that the priest should be killed, which was promptly done, and since that time no priest has attempted to enter the country.

I had a great desire to get as far as Tulum to see this wonderful cross, but my men refused to go beyond Santa Cruz, as they stated that every stranger had to interview the cross and they feared the ordeal. It is said to be four days' journey from Santa Cruz, and the road is only a track through the bush.

It is impossible to ascertain who is the manipulator of this cross or to what extent the chiefs believe in it, or are responsible for the fraud, but I am sure that the majority of the Indians implicitly believe that

the voice which issues from the cross is the voice of God; and they believe that if an enemy were to try to reach Tulum, the power of the cross would make the road full of rocks and holes and prevent the enemy reaching it.

The name of the present chief of the Indians is "Aniceto Sul," but he is generally known as "Don Anis" or "The Governor." He lives in the town of San Pedro, four leagues from Santa Cruz. When I arrived there he had just lost the sight of one eye, and believing he was bewitched, he had killed the man and his wife whom he suspected of doing it, the day before my arrival, and he believed his eye was getting better in consequence.

It is surprising to hear the pious ejaculations of these people when one remembers the number of atrocities laid to their charge. Their term for "Thank you" is "God protect you," and when I was leaving them one and all piously hoped that God would be with me on the journey.

It is impossible to get any information from them, as they strongly object to being questioned. Some very simple questions which I asked were answered, but were always supplemented by the counter-question "Why do you wish to know?" On one occasion wishing to hear of ancient Indian ruins, I was questioning several Indians in the chief's house, and getting unsatisfactory answers, pressed the question, when they turned down their hat brims and peeped at me from under them, and simply answered in monosyllables. This so frightened my interpreter that he refused to go on with the questions.

Santa Cruz town is very similar to Bacalar, and is occupied by a guard of about 150 men, but nobody lives there permanently. The chiefs meet there for consultation and for settling the affairs of the nation. They are armed with Enfield rifles, and machetes made in the form of a short scimitar, and are very confident that they will be able to beat any army sent against them by the Mexican Government, which they are daily expecting. The machetes are made by themselves, but they have iron through British Honduras, as none appears to exist in their own country. Considering that they have so few tools the machetes are very well made and have handles of horn.

The Indians are in colour a dark brown and have thick jet-black hair which they do not train in any way, and it looks of the same colour and texture and lies in just the same manner as the bearskin headdress of our own Grenadiers. Some of them are well-made stalwart men, but the vast majority are short and slightly made. They dress in cotton trousers and shirt and a straw hat, sandals on the feet, and when on duty as soldiers they have two leather straps, one over each shoulder and crossing on the breast. One strap supports the machete and the other the cartridge-box. These straps are held in to the waist by a belt passing outside them. These straps give them quite a correct military appearance. The trousers are made very wide in the legs, and when

travelling they are rolled up high on the thigh, and when off duty they frequently leave off the shirt and then appear only to have on a waist-cloth. Whilst at the village of Cumictien the whole male population came dressed in this fashion to look at the stranger.

The last chief of the Santa Cruz Indians was killed, together with about twenty other chiefs, by my host at San Pedro, Don Anis, about four years ago, and the said Don Anis now reigns in his stead and will continue to do so until some other chief contrives to get a party sufficiently strong to kill him in his turn.

In the village of Chunculche are several purely white people, some with fair hair. These I was informed are descendents of Spaniards who were not killed by the Indians at the time they revolted, but retained as prisoners. These people speak only the Indian language—"Maya"—and in dress and manner, and so far as I could judge, in ideas, are exactly the same as the Indians by whom they are surrounded.

BELIZE, BRITISH HONDURAS, 1st February, 1888.

Nilometers.

By Colonel J. C. ARDAGH, C.B., R.E.

DURING a residence of five years in Egypt, I have from time to time made notes upon the Nile, which, though far from being complete, may prove interesting and useful to others who take up the subject, and which it may therefore be of utility to place on record.

A historical memoir of the Mekyas or Rodah nilometer is given in vol. xv. of the 'Description de l'Égypte,' by the French Expedition at the beginning of this century, and a plan and section of the Mekyas are given in vol. i. 'État Moderne,' Atlas of Plates, of the same monumental work.

Unfortunately, the reliability of this work is seriously vitiated by what are now well-established errors. The level of the Red Sea, according to the French savants, was nine or ten metres above the Mediterranean, and three or four metres above Low Nile at Cairo. How this result could have been believed, in the face of historical and visible evidences of the existence of ancient canals, is difficult to conceive.

A still more remarkable conclusion, however, was their report that the Birket-el-Keroun, or Lake of the Fayoum, was the original Lake Moeris. As a matter of fact that sheet of water lies no less than 200 feet below the adjacent Nile. It is therefore necessary to receive with great caution, and not without corroboration, the statements of this work.

There were nilometers in the very earliest ages. Those at Edfou and

on the Island of Elephantine are the oldest still existing in a perfect state; but the nilometer *par excellence*, ever since the Mahometan conquest, has been that at Rodah. To it all the records of the movements of the river purport to refer, and when an Egyptian speaks of the height of the Nile, its measurement at Rodah is implied.

The Island of Rodah, opposite to Old Cairo, may be considered as the very apex of the Delta, the last point where the Nile passes in its whole volume, undiminished by canals deriving from it; and it presented consequently a most favourable spot for measuring the river, the more so as the channel lies between two artificially protected foreshores, i. e. those of Gizeh and Fostat, and is therefore of constant width.

At the date of the Arab conquest the chief nilometer was at Holouan or Memphis, for the convenience of that capital. In the year of the Hegira 96, this nilometer was destroyed, and in the following year, A.D. 715, the Rodah nilometer was constructed to replace it. Since that date it has been several times repaired, but, presumptively, the datum has been preserved, and the existing column is believed to be the original one.

The Mekyas consists of a masonry well or reservoir about 17 feet 6 inches square, and 35 feet deep, with a column of octagonal shape in the centre, and winding steps 3 feet in width, descending by irregular flights to the bottom. The column itself was found by the French expedition to be 8·646 metres in length, divided into 16 parts, varying from ·536 to ·550 metres long. These variations are obviously only inaccuracies of workmanship, and the mean of ·540 is accepted as the length of the nilometer *Cubit*, commonly known as a *Pik* to Europeans, and in Arabic a *Draa*. This unit is divided into 24 parts, each called *Kirat* (plural *Kararit*).

It is singular that the ancient Egyptians, who were such very accurate workers in architecture, should not have taken effectual measures to perpetuate their standards of length; nor are we assisted to scientific accuracy by the Greeks and Romans.

The nilometers at Elephantine and Edfou were carefully measured by Mahmoud Pasha el Felaki, with the result that the cubits were found to be ·53 metres in length, and were subdivided into 14 instead of 24 parts. It is, however, only when we descend into the Arab period that the measures become hopelessly divergent. There are at this moment in use in Egypt five different standards of length, all called *Pik* or *Draa*, exclusive of the sacred cubit and of European measures, and also of the two nilometer cubits mentioned above. The fellah uses one, the haberdasher a second, the mason a third, the surveyor a fourth, and so on, up to the Sheikh of the nilometer, who, it might be reasonably expected, should make use of the graduation provided for him on the nilometric column; but, for our utter discomfiture, he does nothing of the sort, and introduces a new element of confusion worse than all the others.

The functionaries charged with the measurement and record of the

levels of the Nile, were in the ancient days the priests. When Christianity was introduced, the office was still vested in the hierarchy; and for many years after the Mahommedan conquest of Egypt, the Copts still had the care of the Mekyas. It was not until the 247th year of the Hegira (A.D. 861) that the office was conferred upon a believer in the prophet—some say a renegade Copt, others that he was a native of Bassora who had been brought to Egypt.

This man, Abou el Raddid, has handed down the office and its traditions to his descendants. The present Sheikh of the Mekyas is named Said Mahommed el Sowafi, a very ordinary person, neither intelligent nor well educated. He performs his functions according to a rule of thumb, handed down to him by his forefathers, in the following manner:—

He pays no attention whatever to the original column or its graduations. The column indeed is so encrusted with mud, that the marks upon it even at the top are not very distinct, and in the lower portion of the well are hardly discernible to good eyesight, and quite invisible to the weak-sighted Egyptian. As the column stands, moreover, in the middle of the well, it is impossible to view the point to which the water rises at a less distance than 6 to 7 feet, so that an accurate reading is practically unattainable.

Beside all this, the well itself and the conduits connecting it with the Nile were so silted up with Nile mud, that it was a matter of some doubt whether there was a free communication with the river, until the level of the water had risen considerably.

The course pursued by the Sheikh is in this wise. He has a mark on a flight of modern stone steps leading down from the Mekyas to the Rodah channel, and this mark he reckon at 11 piks. Until the Nile reaches this his observations are made with reference to this mark. When it is covered, the water-level has reached the 18th step downwards from the top of the well of the nilometer. The next 10 steps upwards he reckons at 5 piks, thus arriving at 16 piks on the 8th step. The next 6 steps he counts as a pik each, i. e. from 16 to 22; and the last two steps as 1 pik, making the level of the top of the stairs 23 piks. Any further increase after 23 piks is measured by a rod graduated in piks of 54 centimetres. The flagrant absurdity of these records is too patent to require demonstration. I shall defer a criticism of them until I have given some further explanations.

The height of the Nile has always been reckoned in cubits or piks. Herodotus^{*} was informed by the Egyptian priests that "in the time of Moeris, when the river rose at least 8 cubits, it irrigated all Egypt below Memphis. But now [i. e. at the time of Herodotus, 900 years after Moeris], unless the river rises 16 cubits, or 15 at least, it does not overflow the country."

^{*} Book ii. p. 13.

Pliny* records that the proper increase of the Nile was 16 cubits. At 12 cubits, he says, there is famine; at 13 cubits, some want; 14 cubits give content; 15, security; and 16, delight. The greatest increase in his age was 18 cubits, in the reign of Claudius. The Roman governor Petronius, who made an expedition up the Nile as far as Napata, in 24 B.C., reported that there were abundant crops at 13 to 14 cubits.

Amrou, the conqueror of Egypt, reported to the Khalif Omar (A.D. 640) that the result of his inquiries was that when the Nile rose to 14 cubits there was a sufficient harvest, but that at 12 or 18 it was bad. Massaoudi (A.D. 947) states that at 16 cubits there was an abundant harvest, and the full tribute was levied; that 17 cubits was the most advantageous height of all; and that at 18 cubits one-fourth of Egypt was inundated, and that any further rise was usually followed by plague. The Baghdad doctor, Abd-el-Latif, who travelled in Egypt in 1192-1201, relates that at 16 cubits the tribute became payable, and the harvest sufficed abundantly for one year; if the river rose to between 16 and 18, the produce sufficed for two or more years. Above 18 cubits there was a falling off, and likewise below 16. A writer in 1470 states that 14 cubits gave a sufficient harvest, 16 a very abundant one, and 18 produced inundation, famine, and epidemics.

A statement of all the floods of the Nile, from the Mussulman conquest, 640, to the year 922 of the Hegira, A.D. 1516, has been printed by M. Langles in 'Notices et Extraits des Manuscrits,' tome viii. Abd-el-Latif gives an analysis of the heights from the Hegira up to his own time, and says that in that period—540 years—the maximum was only twice below 13, six times between 13 and 14, about twenty times between 14 and 15, and frequently between 15 and 16. The usual range between low Nile and the succeeding high Nile he gives at 13 cubits.

In vol. xviii. of the 'Description de l'Egypte' is published a table of high Niles from 1150 H. (A.D. 1737) to 1215 H. (A.D. 1800), furnished by the Sheikh of the Mekyas. In three years the height is given as between 18 and 19, in four years between 19 and 20, eight between 20 and 21, eight between 21 and 22, thirteen between 22 and 23, nineteen between 23 and 24, and ten years between 24 and 25. The results are classified as:—

18-20 Paks	..	..	..	..	..	..	..	Insufficient.
20-22 "	..	..	..	..	..	..	..	Poor.
22-24 "	..	..	..	..	..	..	..	Good.
24 and upwards	..	..	..	..	..	..	..	Excessive.

According to the experience of the Public Works Department, since the records have been regularly kept in metres (at the Barrage, not at Rodah), independently of the Sheikh, the same results have manifested themselves, and the average effective rise is between 13 and 14 paks of

* Lib. v. cap. 9.

54 centimetres above the mean summer lowest level, which is now reckoned at 7 piks.

Let us now abstract and compare these statistics, taking as a basis the height considered as most advantageous to the general produce of the country.

	Date.	Authority.	Height of Nile most Advantageous.
1st group.	5th Century B.C.	Herodotus	Cubits or Piks. 15 to 16
	1st " A.D.	Pliny	14 " 16
	1st " "	Petronius	13 " 14
	7th " "	Amrou	13 " 17
	13th " "	Abd el Latif	16 " 18
	15th " "	Anon	14 " 17
2nd group.	18th " "	Sheikh of Mekyas	22 " 24
	19th " "	Public Works Department	22 " 24

The figures form themselves naturally into two groups, of which the first, extending over 2000 years, shows very trivial variations considering the absence of detailed records and the large degree in which such questions are matters of opinion. The second group shows a sudden and apparently inexplicable rise of about 7 piks on the average of the first group—23 piks as against 16 piks.

How is this to be accounted for? The interval between the points at which the Sheikh now reckons 7 piks and 23 piks is 6.97 metres, which, subdivided into piks of 54 centimetres (the divisions marked on the ancient column), would make very nearly 13 piks instead of 16 as counted by the Sheikh, who from the 16th to the 22nd pik of his scale reckons 27 centimetres as a pik. Evidently, therefore, the 23 piks of the Sheikh's record represent only 20 piks of the scale of the old nilometer. Comparing this with the ancient average of 16, there is still a rise of 4 piks to explain.

Let me here note that the real rise of the river, from 7 piks to 20 piks, on the old nilometer scale, i. e. 13 piks, is the same as that recorded as the average by Abd-el-Latif.

In the exceedingly low Niles of 1201 and 1202, which he witnessed, the nilometer was dry, and it was only after the commencement of the rise that $1\frac{1}{2}$ cubits were recorded in the latter and 2 in the former year, the river eventually rising to $15\frac{1}{4}$ in 1201, and to $15\frac{3}{4}$ in 1202, both being considered insufficient. The height of low Nile is now usually not below 7 piks, and even before the construction of the Barrage there is no record in this century under $4\frac{1}{2}$. It is now, I conceive, quite impossible, as long as the Barrage is maintained, that it should ever fall below 6.

Since the days of Abd-el-Latif, the embankments of the Nile Valley

have in all probability been very much improved, with the probable effect of narrowing the width of the high Nile channel, and possibly increasing the apparent range between high and low Nile, though the records seem to prove that there has been no very sensible alteration in the difference. The mean low Nile, about the period of Abd-el-Latif, was apparently 18 piks below his average high Nile, i. e. 3 to 5 piks, or say a mean of 4, as against the 7 of the present time.

It may, therefore, be presumed (errors excepted) that the level of low Nile, as measured on the Rodah nilometer, has risen 3 piks in six and a half centuries, and the level of high Nile about 4 piks. Taking an average of $3\frac{1}{2}$ piks of 54 centimetres, equal to 1.89 metres, the rate of rise would seem to be about 3 millimetres per annum at Rodah.

The obelisk of Usertasen at Heliopolis, 45 centuries old, is covered at least 3 metres in alluvial soil above its base, which was, no doubt, quite double that height above the ground when it was erected. This would give 2 millimetres per annum as the rate of rise, at a minimum. Again, the colossi of Amenoph at Thebes, erected 34 centuries ago, are now immersed in the inundation up to near the top of the pedestals, and the high Nile level there must have risen at least 7 metres in that time, which likewise gives a minimum rate of about 2 millimetres per annum.

The engineers of the French Expedition calculated the rate of accretion of the soil in the Nile Valley at 126 mm. in a century, but I am inclined to think this under the mark, though the accumulation at Rodah is probably in excess of the average.

The improvement of the Barrage under Sir Colin Scott-Moncrieff, when completed, as it will probably be about 1890, will thereafter lead to a permanent raising of the figure of low Nile above it from 7 piks to 8 or 9; and this very damming up of the water, by checking the velocity of the current in the vicinity of the nilometer, will lead to an increased rate of deposit in the bed of the river, and thus tend further to throw up the levels to a degree which will hardly be counteracted by the scour of high Nile.

Mahmoud Pasha el Falaki, with whom I frequently conversed on the subject, positively stated that he could read the ancient Cufic inscriptions on the nilometric column as seventeen at the top and sixteen for the next lower division; and he considered that the French *savants* were in error in supposing that the graduation commenced at a zero point coinciding with the bottom of the shaft, which is 16 cubits in length.

Accepting his view and his levels, the zero on the ancient nilometer would be 8.646 metres above the mean level of the Mediterranean; and the top of the column, or 17th cubit, 17.833 metres above the same datum. We must therefore add one cubit to the readings on the column given by the French Expedition.

In 1799, low Nile, according to the Sheikh's scale, was $2\frac{1}{2}$, and on the No. I.—JAN. 1889.]

nilometer $3\frac{1}{2}$ cubits according to the French assumption, or $4\frac{1}{2}$ by Mahmoud Pasha.

The Sheikh's following high Nile was $20\frac{1}{2}$, showing $16\frac{3}{4}$ or $17\frac{3}{4}$ on the column according to the two computations.

In 1880 the low Nile of the Sheikh was $2\frac{1}{2}$, showing $3\frac{1}{2}$ or $4\frac{1}{2}$ on the column, and high Nile $23\frac{2}{3}$ by the Sheikh, and $18\frac{3}{4}$ or $19\frac{3}{4}$ on the column.

These readings of the Sheikh naturally excited suspicion and distrust. In 1799 a range of $12\frac{1}{2}$ on the column was called $18\frac{3}{4}$ by the Sheikh, and in 1800 a range of $14\frac{1}{2}$ was called by him $20\frac{1}{2}$. Evidently, therefore, the average length of the Sheikh's piks was about two-thirds of those on the column, at that time.

Passing on now to the recent utterances of the Sheikh, we find that his ordinary low Nile or 7 piks, is represented by about $7\frac{3}{4}$ on the column, and his ordinary high Nile of 23 piks by $20\frac{1}{2}$ on the scale of the column. The old and the new measurements of the Sheikh are, in short, at hopeless variance, and both are incorrect, not to say fraudulent.

A theory has been propounded that the short piks now employed by the Sheikh between the numbers 16 and 22 on his scale, were scientifically devised in order to proportion the rise to the spread of water over the land, but I am quite satisfied that there is no foundation whatever for this supposition. When the comparisons given in the 'Description de l'Egypte' were made, all the piks were uniformly short, and the Sheikh produced a measure marked with these short graduations.

The real origin of the Sheikh's inaccuracy is probably to be found in the exigencies of Egyptian rulers in regard to levying the land-tax, which immemorially was considered to become due when the Nile reached the 16th cubit. The Sheikh then proclaimed *Wafa Allah*—i.e. "God has fulfilled His promise": there was public rejoicing, and the water was allowed to flow into the irrigation canals, notably, the Khalig at Old Cairo, where the ceremony of cutting the dam is still observed. In the ancient days 16 cubits was a sufficiently high Nile; and as it was obviously the interest of the rulers to have the *Wafa* proclaimed as early as possible, in order to entitle them to collect the taxes, so no doubt did it become the interest of the Sheikh to comply with their wishes. The simple way of doing this was to shorten the piks, which he accordingly did. The outer public had no access to the nilometer, and indeed if they had, the reading of the graduations on the column would have been difficult.

Once inaugurated, fraudulent readings became the rule, and have continued to be so up to this day. There is no ingenuity or uniformity in the errors; they indicate arrant stupidity of the coarsest kind, and appear to be regulated by the accidental heights of some modern flights of steps. As a record of the heights of the Nile, absolute or comparative, the Sheikh's measurements, past and present, are perfectly worthless,

and the wretched imposture deserves to be swept away. The sole motive for sparing it is, that the reputed heights in piks have become a well-known tradition among the people, who know by experience that when a certain number of piks is proclaimed, certain land will be watered, or certain canals will be filled.

The Public Works Department now, however, publish both the Sheikh's figures and the heights in metres above the Mediterranean, the latter alone being relied upon.

The French savants at the beginning of this century found a Corinthian capital placed on the top of the nilometer column, and they added a cube of marble, on which the graduation was continued. After the expulsion of the French, the natives, with that barbarous mischievousness which seems peculiar to them, destroyed this improvement, and when we came to Egypt in 1882 there was neither capital or cube.

During the low Nile of 1887 the well of the nilometer was examined under the direction of Mr. Garstin, and a quantity of architectural débris found embedded in the mud at the bottom, including the above mentioned marble cube, and also several capitals of columns, none of them, however, answering to the drawings or description of the missing one, which must have either been carried off or broken up.

It is much to be desired that the existing makeshift finish of rubble masonry on the top of the column should be replaced by a superposed shaft, which should prolong the column to a height well above any possible maximum high Nile. The new addition to the column should be graduated with metrical heights above the Mediterranean, as well as with the nilometric cubits. But in view of the constant variations in the bed of the Nile where it flows over alluvial soil, it would be advantageous to cut a nilometric scale in the native rock of Gebel Silsili, where the section of the channel is practically invariable, and where the measures, if cut in bold steps, would be almost imperishable.

A metrical scale has been erected this year (1887) by Mr. Garstin at the steps near the nilometer in the Rodah channel, and it is to be hoped that in time the people interested will accustom themselves to the metrical records, and will abandon the misleading irregularities of the Sheikh's proclamations.

If piks are to be used, the ancient scale on the column ought to be reverted to.

The following tables have been compiled from data furnished as follows:—

1. Actual observation on metrical scale.

Columns 3 and 4 furnished by Major Ross, R.E., of Egyptian Public Works Department.

Column 5 from a pamphlet entitled 'Useful Data on the Rise of the Nile,' by J. L. Manoug, Alexandria, 1882.

Column 6 from Mahmoud Pasha el Felaky's pamphlet, 'Le Système Métrique actuel d'Egypte,' Copenhagen, 1872.

Column 7 from the 'Description de l'Egypte,' vol. xviii. Le Père.

TABLE SHOWING COMPARISON OF SHEIKH'S SCALE OF PIKS WITH THE CUBITS MARKED ON NILOMETRIC COLUMN.

Actual Observations of 1887, to compare with 4.	Number of Pik or Cubit on Sheikh's Scale.	Public Works Department Equivalents.		Mr. E. Maneug. Heights above Mediterranean on Sheikh's Scale in Metres.	Heights of Graduation of Original Nilometric Column above Mediterranean in Metres.		Number of Piks or Cubits on Scale of original Nilometric Column.
		Intervals on the Sheikh's Scale.	Heights above Mediterranean on Sheikh's Scale in Metres.				
1	2	3	4	5	6	7	8
..	27	·54	21·70	..	23,236	Intervals actually measured on the Column. Remainder of the Scale is calculated at average of ·5404.	27
..	26	·54	21·16	..	22,695		26
20·59	25	·54	20·62	..	22,155		25
20·05							
19·78	24	·54	20·08	19·80	21,615	Top of Col. ·540 Remainder of the Scale is calculated at average of ·5404.	24
19·51							
19·23	23	·54	19·54	19·27	21,074		23
18·975	22	·27	19·00	18·73	20,534		22
18·56	21	·27	18·73	18·46	19,993		21
18·185	20	·27	18·46	18·19	19,453		20
17·75	19	·27	18·19	17·92	18,912		19
17·75	18	·27	17·92	17·65	18,372		18
..	17	·27	17·65	17·38	17,833		17
..	16	·27	17·38	17·10	17,292		16
16·815	15	·49	16·89	16·57	16,753		15
16·01	14	·49	16·40	16·04	16,217		14
..	13	·50	15·91	15·48	15,671		13
..	12	·54	15·41	14·96	15,121		12
..	11	·56	14·87	14·41	14,573		11
..	10	·58	14·31	13·87	14,027		10
..	9	·58	13·73	13·32	13,496		9
..	8	·58	13·15	12·78	12,955		8
..	7	·58	12·57	12·25	12,419		7
..	6	..	..	..	11,881		6
..	5	..	..	..	11,338		5
..	4	..	..	..	10,802		4
..	3	..	..	..	10,267		3
..	2	..	..	..	9,726		2
..	1	..	..	..	9,186		1
..	0	..	..	..	8,646	Bottom of Col.	

NOTE.—At date of French Expedition the Sheikh's Piks were all short ones of about ·36 length.

NOTE.—The Nile in 1887 was unusually high, and was only prevented from being destructive by hastily raising the main embankments of the river, and by constant attention and watching day and night, so as to ensure that weak places should be at once repaired and strengthened. Had the river risen even one foot more, it is very probable that a great tract of land in the Delta would have been inundated, and the crops destroyed. The main embankments want heightening and strengthening everywhere, and should be made up every year in anticipation. If this is not done, there will certainly be a catastrophe.

The high Nile of 1888 was of insufficient height to cover much of the land in Upper Egypt which is cultivated by inundation. The occurrence, however, is not very unusual, and it needs no assumption that the Upper Nile or its tributaries have been tampered with, as has been suggested.

The supposition that abnormal deficiencies in the Nile are caused by interference with the upper affluents, is of very ancient date, but has no sound basis, and may be regarded rather as a superstitious explanation. Former rulers of Egypt have sent missions to the former rulers of Ethiopia, to entreat them not to cut off their water supply, and these potentates have condescended to undertake that they would permit the Nile to flow in its accustomed manner; but, as far as can be known, the apprehensions of the Egyptians were groundless, and the assumed power of interference of the Ethiopians hypothetical. There is no evidence to show that anything of the kind has ever been really attempted. That it is impossible I do not aver. A civilised administration, controlling in a scientific manner the courses of the Atbara, the Blue and White Niles, and the Bahr Ghazal, would have Egypt completely at its mercy; but the condition has yet to be realised. Sooner or later it may be, and it will then be recognised—perhaps too late—that the interests of Egypt and of the Soudan are inseparable. It is necessary and indispensable to recognise now, that, as the oracle of Ammon declared, thousands of years ago, Egypt is the country watered by the Nile; and that on the Nile all its prosperity depends. As in the past, so in the future, excess and deficiency will assuredly recur in the annual flood; and unless due provision is made, there will be repetitions of the dream of the fat and lean kine; and of the terrible tales of suffering told by the Arab historians, notably by Abd-el-Latif.

A "good Nile" is produced by a favourable combination of the rainfall in the several regions of the Equatorial Lakes, the Bahr Ghazal, and the Abyssinian mountains; but it is also to some extent influenced by the condition of the "sudd" or floating vegetation above Khartoum. A great and abnormal accumulation of water tends to break through the "sudd" and produce a rush of water which may occasion a very high Nile. This clearing of the channel may, in the ensuing year, allow all the rainfall to run off easily, and may result in the Nile at its highest being still too low. Until the Nile is regulated we shall be subject to these incidents.

But there is one thing which we can do now, and that is, store the surplus water of high Nile, and utilise it at low Nile. It is not sufficiently generally known that at the present time every drop of water during the period of low Nile is utilised—none is allowed to escape—and that until more water is available, it will not be possible to bring more land under cultivation. There are two schemes for doing this. The earliest is that of Linant Pasha, lately revived by M. de la Motte,

of creating "barrages" on the Upper Nile. The principle is sound, but the execution rather hazardous.

The second is the revival of the old Lake Mœris, advocated by Mr. Cope Whitehouse, who, in his researches after the reservoir of Amenemhat, has discovered a basin of depression which is capable of being utilised as a reservoir for the surplus water of high Nile, at a moderate expense, and with results which, as far as experts can judge, will be both remunerative to the country and to the capitalists who embark on the enterprise. This ought to be undertaken by the Egyptian Government. The chronic state of impecuniosity of the country, and the heavy, nay overpowering and paralysing weight of its external debt (in which all the Powers are interested) render this difficult. The course most attainable at present appears to be the grant of a concession, on such terms as shall give a fair profit to the capitalists, and an eventual reversion to Egypt of the full benefit of the scheme, when the term of the concession has expired.

The material interests of England in Egypt are represented by more than half of its whole export and import trade, say ten millions annually out of twenty; by our share in the external debt, say thirty millions of capital; and by our responsibility as the mandatory of Europe for the good government of the country. It is therefore meet that we should bestir ourselves to promote measures which, like these schemes for storing the water of the Nile, promise substantial advantages to the country.

GEOGRAPHICAL NOTES.

The Disaster in the Caucasus.—The luggage of Mr. W. F. Donkin and Mr. H. Fox has recently been received by their friends in England. It contains a careful diary, with observations kept by Mr. H. Fox up to the afternoon of the 28th August. It appears from this that the note published in our last number requires correction in the following particulars:—The travellers did not ascend Dychtau on the 27th August, but were repulsed after reaching the ridge north of the peak overlooking the Mishirgi Glacier by weather and other difficulties. They returned to camp on the night of the 27th, not the morning of the 28th. They left for the pass to Karaoul early on the 29th.

Dutch New Guinea.—Further light has been thrown upon the important question of the supposed water-way between Macuer Inlet and Geelvink Bay, the existence of which was reported by Captain Strachan. It appears that Dr. A. Meyer's explorations, the results of which it will be remembered were incompatible with Captain Strachan's conclusion, have recently received important confirmation from the investigations of certain Dutch officials. Lieutenant Ellis, who explored the north and

west coasts of New Guinea from May to November 1887, was unable to find this reported water connection, or to gain any information about it from the natives. His own investigations, and the enquiries instituted by him, force him to the certain conclusion that no such connection exists; and in this he is supported by the opinion of Dr. Host, another explorer.

Dr. Meyer's route through Usambara.—We have already announced* the unexpected termination of Dr. Meyer's second expedition to Mount Kilimanjaro, in consequence of the disturbed state of the country on the East Coast. It appears, however, that the expedition was not altogether barren of results, as Dr. Meyer and his fellow traveller, Dr. O. Baumann, succeeded in crossing the country of Usambara by a new route, and the results of their travels will add considerably to our knowledge of the district, although, unfortunately, they were robbed of their collections and belongings by the Arab chieftain, Bushiri, not far from Pangani. The following details of their route have been published in Petermann's 'Mittheilungen' (No. 12). Separating themselves with a party of sixty men from the main caravan, which proceeded along the usual route by the Pangani river, they started at the end of August and marched through Bondei to the mission station of Magila. From there they travelled for several days through a fertile and, in places, thickly-wooded depression, which forms part of the Sigi basin, and on 8th September arrived at Hundu by way of the Kombola mountain and the village of Nkinsala. Leaving Hundu they crossed the high and well-wooded ridge of Mielo, descending on the other side into the extensive valley of the Kumba river. The next few days were occupied in traversing the territory of the chief Jashatu, which is deficient in water, and comparatively bare until the high ridges to the north-west are crossed, when the country changes into a beautiful meadow-land. On the 18th September, the party encamped in the valley of Mlalo, where the Uмба takes its rise. This region is covered with numerous and large villages, and is well cultivated and apparently suitable for cattle-rearing. Two days' journey through wooded and mountainous country brought the travellers to Mbanamu, a considerable village, the inhabitants of which recollected the visit of von der Decken and Kersten many years before. From this point they followed Kersten's route to Gorja. Here they learned that the main caravan, which should have met them at Kinsuani, had been detained at Masinde, the residence of Sinboya, king of Usambara; whither they proceeded with all possible speed, but fifty-four out of their sixty men deserted on the way. At Masinde they found that 140 men of the main caravan had also deserted; a letter from the Wali of Pangani, sent apparently at the instance of the Sultan of Zanzibar, having been the cause of the porters leaving the travellers in the lurch. Nothing daunted, Dr. Baumann with two Somali youths,

* 'Proceedings,' 1888, p. 708.

two porters, and some of Simboya's people, set out again to explore the mountains, and, having visited Vuga, the capital, arrived eventually at a fertile region inhabited by the Wambugu. These people differ completely from the Washambā of Usambara, and are a remnant of the aborigines of the mountains, speaking a dialect similar to the Kipare. It was at this point that Simboya's people received an order to return to Masinde, leaving Dr. Baumann with four men to pursue his journey. A few days later he also returned to Masinde by way of Mlalo and Mkusu, having been joined at the latter point by Dr. Meyer. The travellers were compelled to leave all their loads behind with Simboya; then, taking only their collections and instruments with them, set out for the coast. On the way they were robbed, as stated above, by the Arabs near Pangani, were put in chains, and only set free after payment of a heavy ransom. Although all their notes and surveys are in the hands of the Arabs, they hope to be able to buy them back, and so to be in a position to prepare a map of their route.

The Trade of Quilimane.—Vice-Consul Ross' Annual Report for 1885 on the trade of the district of Quilimane, on the East African coast, has recently been published by the Foreign Office (No. 414). The statistics of the year 1885 are the latest which have been published, and they represent an exceptionally good year, compared with the preceding, and also with subsequent years, so far as can be judged. The chief articles of export are oil-seeds, ivory, india-rubber, and bees' wax. The oil-seeds include sesame seed, ground nuts, and copra, and were exported in 1885 to the value of 48,560*l*. The export of ivory amounted to 37,000*l*. The three chief sources of ivory are the Zambesi, Shiré, and Arab caravans. The first-named branch of the trade is in the hands of a few Portuguese traders, who make their headquarters at Tete, and periodically send hunting and trading parties far into the interior. The second source includes the ivory of the great Shiré marshes and of the country immediately south of Nyassa, and also a quantity of ivory bought and stolen by Arab traders between Nyassa and Tanganyika. The third source is that of the Arab caravans, which, for many years, have visited the coast; many come from Nyassa land. Oil-seeds and ivory form together about 90 per cent. of the total exports. Bees' wax is gathered in all parts of the country by the natives, and rubber is obtained mostly from the lower districts near the sea; the export of the former amounted to 5160*l*, and of the latter to 1450*l*. The other exports are quite insignificant. The imports for 1885 amounted to 102,752*l*, as against 89,400*l* in 1884. Both in exports and imports England and her colonies stand far ahead of all other countries put together; France comes next. The Report states that "the statistics of 1885 show that Quilimane is distancing in its returns the other ports of the coast, and though 1885 was probably an exceptional year, neverthe-

less Quilimane is always a self-supporting district, and has every month a surplus of receipts over expenditure. There are great tracts of rich country virtually unknown and unworked. With two ports for the export of its products, and unrivalled waterways for transport to these, the district wants but the entrance of energy and capital to cause a great development."

M. Ch. Rabot's recent Journey along the West Coast of Greenland.—

At the meeting of the Geographical Society of Paris, held on 2nd November last, M. Charles Rabot, the well-known explorer of Lapland, gave an account of the voyage recently made by him along the West Coast of Greenland. One of the principal objects of the traveller was to study the glacial phenomena of that part of Greenland. The following are the results of his observations—(1) From a comparison of the inland ice of Greenland with the glaciers of Lapland, of the type of the Svartis and the Jökulfjeld, it appears to M. Rabot absolutely certain that the latter glaciers are inland ice in miniature. He is of opinion that the Svartis and the Jökulfjeld are vestiges of the glacial period in Scandinavia, which have remained to the present day in consequence of particular circumstances. (2) The great glacier of Jakobshavn has made a movement in advance during recent years. It has advanced about $1\frac{1}{2}$ miles beyond the point where Lieut. Hammer observed it in 1878. (3) The drift ice of the ice-field, which lies along the south-west coast, only transports a very small quantity of materials. In crossing the ice-field, which is about 60 nautical miles in breadth, M. Rabot only saw one piece of ice, out of 50 or 60, which was covered with any débris of detritic origin.

Trade Prospects in the Brazilian Province of Maranhão.—The Report of Mr. Vice-Consul Airlie on the trade and commerce of this Province for the years 1886-7 and 1887-8, which has just been published (No. 441), contains some pertinent observations on the commercial outlook of the province. The Consul notes with satisfaction the steady increase of the imports, which amounted in 1886-7 to 337,950*l.*, and in 1887-8 to 381,845*l.*; but these figures, although showing an increase on the two previous years, do not nearly reach those for 1883-4, which were 475,461*l.* The exports also exhibit an increase, especially in cotton; but sugar, the other principal item of export, shows a slight decrease for last year. The following table gives the distribution of the exports for the years 1886-7 and 1887-8:—

	1886-7.	1887-8.
	£	£
Great Britain	136,252	169,354
Portugal	158,537	208,529
United States	32,464	43,369
	<hr/>	<hr/>
	£327,253	£421,252

The report then goes on to state that, notwithstanding the fact that production is in a fairly satisfactory condition, as shown by the above figures, the prices of produce have continued unremunerative. The labour problem, consequent upon the recent abolition of slavery, still remains unsolved. The province is exceptionally rich in natural products, requiring only workers to turn them to account. The crops of the present year are reported to be unusually large, but it is impossible to say what proportion will be collected, owing to the want of labourers. The future of the province depends upon the settlement of the labour question. The Report also gives some information about the discovery of indiarubber trees in the province. A Mr. Bernes has been for some months conducting explorations for commercial purposes on the Gurupy river (which divides this province from that of Pará), and he reports that he has discovered the rubber-tree in more or less abundance in the zone between 2° and 6° S. lat. He also found balsam capivi, tonka beans, and sapucaia nuts in great quantities.

Geographical Societies of the World.—From an advanced sheet of the section of the twelfth volume of the 'Geographisches Jahrbuch' edited by Professor H. Wagner, we gather some interesting information as to the growth of geographical societies during the last 68 years. Between 1821 and 1830 only three geographical societies were founded, which were increased by 13 during the next 30 years. In the decade 1861-70, 11 new societies came into existence; during 1871-75, 13, while three collapsed; 1876-80, 31, other three becoming extinct; 1881-85, 43, 10 disappearing. During the last two years, 1886-8, other 10 new ones have come into existence, although six at the same time have vanished. The total number of societies which have been founded since 1821 is 124, and of these 23 have not survived, so that at the present date there are 101 geographical societies altogether. Of these, France and her colonies have more than any other country—29, with 19,800 members, and a gross income of about 12,200*l.* Next comes Germany with 22 societies, 9200 members, and an income of 4600*l.*, followed by Great Britain and her colonies with nine societies, nearly 5600 members, and an income of 12,000*l.* Our own Society still bears the lead so far as numbers and revenue, Paris coming next so far as members go, followed by New York, Vienna, Rome, Edinburgh, Berlin, and St. Petersburg, not reckoning commercial geographical societies and societies that have branches in different countries. There are altogether 130 geographical serials published in the world—45 in French, 41 in German, and only 10 in English.

Geographical Professorships in Europe.—In Professor Wagner's report on Geographical Education in the new 'Geographisches Jahrbuch,' he, as usual, gives a list of the geographical chairs in the universities of different countries of the world. Germany, as before, takes the lead

with 19 chairs, not including that connected with the *Kriegsakademie* of Berlin. In Austria-Hungary there are 14, including technical and commercial schools. Denmark has an extraordinary professorship. In France there are 19 professorships and lectureships connected with the various universities, besides seven lectureships in special institutions. Great Britain at last figures in the list with two chairs, Oxford and Cambridge. In Italy there are 13 professorships, in Holland one, in Russia three, and in Switzerland two. It should be noted that a professorship of commercial geography exists at University College, Liverpool, but it is combined with political economy.

Progress of Educational Geography.—In Prof. Wagner's report on the progress of geographical method and geographical education (1885-88), which will appear in the new volume of the '*Geographisches Jahrbuch*,' there is much of interest connected with the subject, especially with reference to this country. Prof. Wagner analyses in some detail all of importance that has appeared in England during the three years, including General Strachey's lectures, and the papers of Mr. Galton, Sir F. Goldsmid, Mr. A. Geikie, Mr. D. W. Freshfield, Mr. H. J. Mackinder, Mr. Bryce, and Mr. Moseley. Prof. Wagner also refers especially to the educational volume published by the Society, to the Society's Exhibition, and other matters connected with the progress that has been achieved in the last three years. It is gratifying to find so high an authority as Prof. Wagner bearing testimony to the success of the Society's recent efforts to elevate geography and improve geographical education in this country, through their inspector. He emphasises the fact that the "agitation has been guided in the right direction."

The Influence of Forests on Rainfall.—This important subject continues to engage the attention of scientific men in the United States. At a recent meeting of the Philosophical Society of Washington, the subject was very thoroughly discussed by Professor Fernow of the Department of Agriculture, Mr. Henry Gannett of the Geological Survey, General Greely, and others. Mr. Gannett's conclusions, after a careful consideration of his own and other observations, both in Europe and America, are very decided. The investigation has convinced him that forests exercise no influence on the amount of rainfall. We find woodland and a heavy rainfall generally co-existing. In almost all places enjoying a heavy rainfall, the land is covered with forest, unless they have been removed by man. It may be that in this case an effect has been mistaken for a cause, or rather, since it is universally recognised that rainfall produces forests, the converse has been incorrectly assumed to be also true. Although forests have no influence on precipitation, according to Mr. Gannett, they do exert a certain economic influence. Without increasing rainfall, they, in common with other forms of vegetation, economise that which falls; retaining it somewhat as a reservoir, and

preventing its rapid descent into streams. In this way, too, forests tend to reduce the magnitude of floods, and to regulate the flow of rivers. The retention of the rainfall, however, is accompanied by a rapid evaporation from the leaf surfaces of the forest, whereby a considerable proportion of the rainfall returns to the atmosphere without reaching the earth. On this account, Mr. Gannett maintains, it is advisable to cut down the forests in the arid lands of the States, especially in the mountains, as thus a much greater area will be rendered fertile. There is no question but that forests reduce the extremes of temperature in their neighbourhood. They also serve mechanically as windbreaks, diminishing the force of the air-currents. "But with all this," Mr. Gannett asks, "is it worth while to go on planting trees for their climatic effects? It seems to me that, apart from the uselessness of it, nature is planting trees at an infinitely more rapid rate than man. For every tree planted under the Timber-culture Act or on Arbor Day, a thousand spring up of their own accord."

Obituary.

Colonel N. M. Prjevalsky,* Gold Medallist of the Society.—A meeting was held on the 21st November last, at St. Petersburg, in honour of the eminent Russian traveller, Nikolai Mikhailovitch Prjevalsky, whose death at the outset of his fifth great expedition into Central Asia, occurred in November last. We are indebted to our honorary corresponding member, Baron von Osten Sacken, for the following brief summary of the proceedings:—The large hall of the Town Credit Society was thronged with a distinguished assembly of mourners. Among those present were M. Giers, Minister of Foreign Affairs, his colleague, M. Vlangali, Adjt.-General Obruchef, head of the Staff Corps, M. Zinovief, Chief of the Asiatic Department, Prince Voikhonsky, colleague of the Minister of Public Education, Adjt.-General Count Ignatief, M. Otto Struve, Director of the Pulkovo Observatory, M. Bytchkof, Director of the Imperial Public Library, and others, including academicians, members of the military scientific committee, presidents of learned societies, and nearly the whole of the staff of the Imperial Geographical Society.

On the platform were M. P. P. Semenov, Vice-President of the Geographical Society, and his colleague, Baron von Osten Sacken, Major-General Stebnitsky, Professors Mushkétov and Lamansky, M. L. N. Maikof, and other members of the Council. On the right of the platform was placed a portrait of N. M. Prjevalsky wreathed with laurels. Here too was a map showing the routes of the four expeditions carried out by the famous traveller.

The meeting was opened by M. Semenov, who spoke to this effect:—On the 20th October (1st November, N.S.), typhus fever carried off our great scientist, Nikolai Mikhailovitch Prjevalsky. He had suffered much from the hardships undergone during his previous journey; constant exposure to icy winds, and drinking melted snow-water had undermined his strong constitution. Unmindful of his health, he took

* Communicated by Mr. E. Delmar Morgan.

no care of himself at the last, and did not apply for medical aid till it was too late. His last wish that he should be buried on the desert shore of Lake Issik-kul has been fulfilled. His remains have been consigned to the earth at a spot about eight miles from Karakol, where the snow-capped mountains keep watch over his grave. Here a monument of the marble of the locality will be erected.

A few biographical reminiscences will not be out of place here. Prjevalsky was born at the village of Kimbrovo, in the Government of Smolensk, of gentle parents, on the 31st March, 1839. He was educated at the Gymnasium of Smolensk, and entered the military service as a common soldier in September 1855, obtaining his officer's rank in November 1856. From December 1864 to November 1866 he was lecturer on history and geography in the Warsaw Cadet School. On the 5th February, 1864, he became a member of the Russian Geographical Society. From 1867 to 1869 we find him travelling in the Ussuri country, in the far East. The results of this journey were published on his return, and for a paper written by him on the native population of that region he was awarded a silver medal by the Russian Geographical Society. He was in 1869 admitted to the Staff Corps. The following year he started on his first expedition to Central Asia, which lasted till September 1873, the results being published in an important work translated into nearly every language. He was for these services promoted to the rank of lieutenant-colonel, and received a pension of 600 rubles per annum. He was also made corresponding member of the Berlin Geographical Society, and received in 1875 the Constantine medal of the Russian Geographical Society, their highest award. In 1876 the Paris Geographical Society conferred on him their gold medal. His first journey in Central Asia covered 7400 miles; his second, from Kulja to Lob-nor, in 1876-7, measured 2650 miles. For this too he was promoted to the rank of colonel, became honorary member of the Imperial Academy of Sciences, received the Humboldt medal and the honorary membership of the Berlin Geographical Society, and in 1879 the Patron's medal of the Royal Geographical Society of London.

Prjevalsky's third expedition to Central Asia was carried out between the 21st March, 1879, and the 19th October, 1880. On this journey he explored the sources of the Yellow river, accomplishing 4760 miles. Fresh honours now awaited him. The Tsar gave him an additional pension of 600 rubles per annum, he was made member of the Military Scientific Committee of the Staff Corps and had the honorary degree of Doctor of Zoology conferred on him by the Moscow University. He also became honorary member of the St. Petersburg University, the St. Petersburg Society of Naturalists, the Ural Society of Lovers of Natural Science, of the Vienna and Italian Geographical Societies. He was also enrolled an honorary citizen of St. Petersburg and Smolensk in 1881, and honorary member of the Hungarian Geographical Society in 1882. His fourth journey into Central Asia began on the 8th November, 1883, and ended on the 20th October, 1885; it extended from Kiakhta to the sources of the Yellow river, including the exploration of Northern Tibet and of the route *via* Lob-nor and the basin of the Tarim, a distance of 4880 miles, added still further to his fame. He was now awarded the "Vega" medal by the Stockholm Geographical Society, the great gold medal of the Italian Geographical Society, while the Tsar promoted him to the rank of Major-General, and the Imperial Academy of Science struck a special medal in his honour as the first explorer of the natural features of Central Asia. The same year the Moscow Society of Lovers of Natural Science, Anthropology, and Ethnography elected him as their honorary member, while the Council of the Imperial Russian Geographical Society, in order still further to mark their appreciation of his services, passed a resolution that one of the ranges of mountains he discovered should be named after him. In the course of the present year the Paris Geographical Society made him

one of their honorary members. While honours were freely showered on him, he still turned his steps towards Central Asia, ever intent on reaching Lhasa, the goal of his many journeys. But he had hardly set out when a premature death carried him to that bourne from which no traveller returns.

Frank T. Gregory.—The death of this able surveyor, one of the pioneer explorers of the interior of Australia, took place on the 24th of October last, at Harlaxton, his estate in Queensland. We first hear of him in 1858, when, as Assistant Surveyor of Western Australia, he successfully conducted an exploration of the Murchison, Lyons, and Gascoyne rivers in Western Australia, during which he travelled nearly 2000 miles in 107 days, and besides surveying the country, made valuable observations on its geology, climate, and agricultural resources. In 1861, he led a still more important expedition, which the Home Government were induced to despatch on the recommendation of the Royal Geographical Society, in which he discovered the Fortescue, Ashburton, and De Grey rivers, and other streams, besides large tracts of fertile land, making, as before, observations of lasting value on the geology and resources of the region explored. Among the discoveries made was that of the Nicol Bay pearl fishery. His surveys on this expedition commenced at Nicol Bay and extended to the interior southward as far as 24° S. lat., and afterwards eastward to 121° 40', and to the north-west coast in 20° S. lat. The narrative and map of this important expedition were published in vol. xxxii. of our Journal, and the precision and solidity of his work obtained for him the honour of the Founder's Medal at our Anniversary Meeting of 1863. He served for some time as Surveyor-General of Western Australia, and subsequently settled in Queensland, where he became a Member of the Legislative Council.

REPORT OF THE EVENING MEETINGS, SESSION 1888-9.

Second Meeting, 26th November, 1888.

General Sir C. P. BEAUCHAMP WALKER, K.C.B., Vice-President,
in the Chair.

ELECTIONS.—George Henry Addy, Esq.; Gordon Allan, Esq.; Antonio Joaquim Basto, Esq.; Alfred A. Borradaile, Esq.; George Buchanan, Esq., C.E.; Rev. W. Pelham Burn; Frank Chauntler, Esq., C.E.; J. G. Cockin, Esq.; Major-General Reginald Curtis, R.A.; Thomas M'Laren Davidson, Esq., M.A.; Lieut. Dayrell Davies, R.N.; John Stuart Dismorr, Esq.; Percy Francis Du Croz, Esq.; John Gardner, Esq.; R. G. Haliburton, Esq., Q.C.; Walter Thomas Hansford, Esq., J.P.; W. Burton Harris, Esq.; Rev. Alexander Hetherwick, M.A.; Randle Fynes Wilson Holme, Esq.; Henry Brereton Hooper, Esq., I.M.; Ivan Nikolaievitch Kargopoltsch, Esq.; William Frederick Leeson, Esq.; Capt. J. Fiot Les Pearce Maclear, R.N.; Dumaresq Williamson Manning, Esq.; Edward Charles Merewether, Esq.; Hendrik Pieter Nicolaas Muller, Esq.; Herbert Naylor-Leyland, Esq.; John J. Olding, Esq.; Commander Thomas William Oliver, R.N.; George F. Packer, Esq.; Capt. John Page (Argentine Navy); Nicholas Parkinson, Esq.; John Home Peebles-Chaplin, Esq.; Rev. Charles Richard Pollock; William Robinson, Esq.; William Hodnett Rowland, Esq.; Henry Schlichter, Esq.; Jonathan C. B. P. Seaver, Esq., M.P. (New South Wales); Norman William Shairp, Esq.; John Speak, Esq.; Alfred Usher, Esq.;

Henry Charles Usher, Esq.; James P. Walton, Esq.; Edmund Hannay Watts, Esq., junr.; Edwin James Welch, Esq.; Francis Wellington Were, Esq.; Colonel Frederick Benjamin White (1st West Indian Regt.); Right Rev. J. H. D. Wingfield (Bishop of Northern California); Arthur Woodhouse, Esq.

The paper read was:—

"A Journey to Southern Morocco and the Atlas Mountains." By Joseph Thomson, Esq.

Vide ante, p. 1.

Third Meeting, 17th December, 1888.—General R. STRACHEY, R.E., F.R.S., President, in the Chair.

PRESENTATION.—*Dr. John Davies.*

ELECTIONS.—*Hon. G. Curzon, M.P.; Harry Grattan Guinness, Esq.; Rev. Thomas Harrison; Charles Wilmot Jemmet, Esq.; Henry Grattan Johnson; Capt. Wm. J. Myers (King's Royal Rifles); J. Reynolds, Esq., M.D.; Felix O. Schuster, Esq.; Leonard Sutton, Esq.; Hermann Woolley, Esq.*

The paper read was:—

"Explorations on the Chindwin River, Upper Burma." By Colonel R. G. Woodthorpe, R.E., C.B.

Will be published, with map, in a subsequent No. of the 'Proceedings.'

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—November 2nd, 1888: Dr. W. HAMY in the chair.—Baron de Bieberstein forwarded some information with regard to the projected Siberian railway, called the Obi-Irtish line. While English merchants, his letter stated, were seeking at the peril of their lives and at great expense to secure fresh markets for their goods in Siberia by way of the Kara Sea, the Russians were making preparations for the construction of a railroad which would connect the rich basin of the Obi and the Irtish with a harbour on the European coast of the Arctic Ocean. The scheme, which had been originated by M. Golovatcheff, had received the assent of the Russian Government. The line would start from a point near the town of Obdorsk, and run in the direction of the Ural Mountains, which it would pierce by means of one of the transversal valleys which lie at an altitude of only 100 feet above the level of the sea. Then crossing the river Ussa in its upper course, it would traverse the marshy lands ("tundras") of Bolchesemelsk and terminate on the coast of the Bay of Chäinudir a little higher up than Cape Belkoff. The length of the line would be a little more than 265 miles. From a commercial point of view, the line would have an important bearing on the development of the resources of Siberia. It would convey to European markets the products of the most remote regions of the south, such as Biisk and Barnaul on the Obi and Semipolatsinsk on the Irtish, districts rich in cereals and cattle. It was calculated that the time required for the transit of goods from these places to London would be 24 days instead of 130 by the present route, and the cost would be reduced by nearly one-half.—M. Dutreuil de Rhias presented a manuscript work entitled "Questions hydrographiques du Thibet sud-oriental," which was a reply to a recent article by

General Walker in the September number of our Proceedings.—With regard to the mission directed by M. Fournereau in Indo-China, M. Delaporte wrote (June 1888) to the effect that M. Fournereau, after having led his expedition into the country on the north-west of the great Lake Tonky-Sap, and accomplished his programme in that part of the country, had turned eastwards and sought to penetrate into new regions. In this attempt he was baffled, the country being deserted by its inhabitants and ravaged by bands of rebels driven from Cambodia. He was consequently forced to return to Phnom-Penh, whence a further attempt was made along the same route, but the excessive heat obliged him to again retreat. M. Fournereau was now prosecuting his travels in Saigon.—M. Foa sent from Porto-Novo, on the west coast of Africa, a memoir with reference to the River Wheme or Oagho, which forms the natural boundary between the kingdom of Porto-Novo and Dahomey but which does not figure on most of our maps. It was stated that this memoir, together with the accompanying map, would be reserved for the publication in the "Quarterly Bulletin."—Two important documents with reference to the French possessions on the Congo were received from the Minister of Public Instruction, to whom they had been communicated by M. de Chavannes, French Resident on the Lower Congo and Niari. The first was a map of the region comprised between Brazzaville and the coast of Loango, which embodies a series of exact surveys recently made by the administration. The second document was a report by M. Jacob, Engineer, on the lower portion of the Nairi which is obstructed by rapids. M. Jacob has thoroughly surveyed this part of the Niari, and is convinced that it can be rendered navigable.—M. de Chavannes states that he has opened a direct route between Ludima and Loango across the immense and mountainous forest of Mayombe.—Prince Roland Bonaparte communicated a letter, addressed to him by M. H. Ten Kate from Arizona, where he was engaged as a member of the Hemenway South-western Archaeological Expedition, in ethnological researches. Important scientific results had been obtained.—The Minister of Public Instruction also forwarded a letter from M. Coudreau, dated 2nd August 1888 from Cayenne, announcing his approaching return to the Tumuc-Humac Mountains and the territories of the Oyampi, Piriu, and Emerillon Indians. A further letter, dated September 10th and communicated by M. Gauthiot, intimated the arrival of the traveller at the Tumuc-Humac. He intended to explore the range from the head waters of the Maroni to the eastern sources of the Oyapok. He would also visit the mysterious lake Agamiuare, and the head-waters of the Ku and Camopi. The population of these regions (Oyampi race) was numerous and not hostile.—M. R. du Gaillaud communicated some information extracted from recent missionary publications, including further details of the journey made by one of the missionaries of Yule Island up the Saint Joseph river* in company with Messrs. Cameron and English in October 1887. In February of the present year Mr. Cameron made another attempt to ascend the St. Joseph, but was baffled by the hostility of the natives higher up the river.—The Chairman intimated the presence at the meeting of MM. Thouar and Novis, and in the name of the Society welcomed them back after their arduous travels in the Gran Chaco. On the invitation of Dr. Hamy, M. Thouar gave a rapid résumé of his operations.—M. H. Duveyrier called the attention of the Society to the explorations of M. de la Martinière in Morocco. The latter traveller, who for some years had been engaged in archaeological and geographical work in that country, had just sent home some of the results of his labours in the region extending to the north of Mequinez, and to the west of Féz. These included a topographical survey of the two mountains of Djebel Tsefüt and Djebel Zer-hün, and other surveys which would materially affect

* 'Proceedings R.G.S.,' 1888, p. 389.

our maps of that district both by removing errors and filling up blanks. No other traveller, he said, had devoted so much labour and attention to this part of Morocco as M. de la Martinière had done.

— November 16th, 1888: DR. HAMY in the chair.—A communication was read from M. Mich. Venukoff, with reference to the death of General Prejevalsky, which took place at Karakol on the 1st November, where he was making preparations for his journey into Tibet. M. Venukoff's letter contained a short biographical sketch of the celebrated traveller. At a later stage of the meeting M. Venukoff added a few words to his written communication, and laid on the table a map of Central Asia with the four itineraries of Prejevalsky traced upon it. He also made some observations with regard to an important journey of exploration which had been made by M. Grubtchevsky in the western parts of the Kuen-Lun, Karakorum, and the Himalaya. M. Grubtchevsky started in the month of July from Ferganah, and traversed the Pamir throughout its whole length from north to south, and further, paid a visit to Kunjut. In his route across this interesting country he was stopped by the Chinese, at the same place, Tashkurgan, where MM. Bonvalot and Capus had been compelled to threaten the Chinese commander of the station with cutting off his ears. The traveller, however, managed to get through. At the present time he was on his way home, having visited the celebrated Mustagh range, described by Mr. Younghusband in 1887, and the lofty plateau or "pamir" of Taghdumbach.—M. de Ujfalvy communicated the contents of a letter which he had just received from M. H. Dauvergne, a naturalist and ethnographer, giving an account of his last journey in Central Asia. M. Dauvergne had spent the last 22 years in Kashmir, during which time he had made numerous journeys in different parts of Central Asia. This year he started from Ush and crossed the Alai plateau, and then visited the Thian Shan for the purpose of hunting the *Ovis Poli*. Returning to the Alai, he proceeded southwards and explored the Pamir from Kizil-Yart to Pamir-Kalan, near Sarikol. He then effected his return to Ush, whence he set out on a journey eastwards, in the course of which he traversed Kashgaria from north to south, then, crossing the Kuen-Lun and Karakorum, arrived by way of Sasser-Ia and Kardong at Ladak on 22nd September. —A memoir was received from Captain Conrad, the district commander at Bammako, on the Upper Niger, on the latter locality and the adjoining countries. The author, who had been for five years in Upper Senegal, and for the last 15 months stationed at Bammako, gives an account of the political and commercial history of the district, and its outlook for the future. In conclusion, M. Fournereau gave an account of his exploration of the Khmer ruins of Siamese Cambodia, in the province of Siem-rap.

Geographical Society of Berlin, November 3rd, 1888 (continuation of Report*): Professor VIRCHOW spoke upon the country and people of old and new Egypt. The leading object which he had in view in his journey to Egypt, undertaken in the spring of this year, was to inquire how far the peculiar features of a country, the climatic and other conditions, exercise an influence upon the physical man, and whether, for example, under the influence of soil and climate, a long skull can be produced from a short skull, and a yellow-skinned man from a black-skinned, or vice versa. Although a final and satisfactory solution of this question is not yet to be expected, the solution of it in the case of Egypt is of great importance, because in that country, the oldest historical data have made us familiar with men of the most highly developed civilisation, who, through the position of their habitation—

* See December Number, 1888, p. 801.

an island in the sea of desert—appear, in the most remote times, to have been shielded from foreign influences. At the time of the most ancient historical king of Upper Egypt, King Menes, who reigned from about the year 6000, we find there already a people with all the arts of civilisation, an elaborate state-system, a complete hierarchy, famous monuments of architecture and sculpture, and the rudiments of painting. But what was the state of things before the time of Menes? Here the threads of history break off short, the pre-historic period is filled up by later Egyptian and Grecian writers by means of a promiscuous collection of legends and myths, of which the natural philosopher can take no account, although Professor Lant, of Munich, has endeavoured, and not without success, to extract a reliable historical kernel out of the myths. Since 1869, positive data have been continually collected, and the result is to show that there has been an Egyptian stone age. But between the latter and the age of Menes, which presents the arts of civilisation in complete form, there exists a yawning gap, and we seek in vain for a connecting link between any one of the oldest temples near the Sphinx, which itself presents no inscriptions and decorations of the later age, and the period of the stone age. As to the fixed rules, according to which the Egyptians produced their works of art, we now know some details. The supposition which was long held, that the ancient Egyptians at the time of Menes correspond with the type of man to-day existing there, has been shown to be erroneous. Since the mummies of the old Egyptian kings, such as Sesostrius, Setti, Ramses, &c., were discovered in 1870, and the skulls of these conquerors have furnished us with measurable data, it can be asserted with safety that the existing images and statues of these rulers are not portraits, but that the latter were fashioned according to a certain design. We are not, however, in the same position with regard to the sculptures of the older dynasties. Of these we only find scanty remains; some skulls, authenticated but partially covered by inscriptions, are the only relics which we possess of that earlier time, viz. from the 5th Dynasty backwards. With these, however, the statues agree. They are the skulls of short heads, while the fellaheen of to-day have long heads. This, then, at least may be taken as settled, that a change of type in the case of the dynasties has taken place. The case is otherwise with regard to the ethnological figures on the Egyptian works of art which are represented beside the kings. These show that in the oldest historical times the different types of people, which we even to-day find in Egypt and the neighbouring countries, were just as sharply distinguished from each other as now. The question in this case, however, is not about portraits but about types, in which the essentials, such as the kind of hair, form of skull, &c., remain the same, while the externals, the armour, clothing, &c., change according to the periods of time. The oldest representation of a negro is found in the tomb of Una, one of the kings of the 6th Dynasty. In the opinion of many, especially of Lepsius, the territory situated between the first and second cataracts, between Assuan and Wadi Halfa, which is the true Nubia or Ethiopia, is the district where the change of the Central Africans into the Egyptians took place. It is that same region which for four thousand years down to the present time has been the object of strife between the northern and southern races. In the oldest times the country which lies immediately south of Assuan was called Kash (the Biblical Kush). Lepsius has tried to prove, from considerations of language, that the inhabitants of Kash were negroes. The investigations of Professor Virchow on the spot, however, have resulted in establishing the contrary. The Nubians have, neither in skin, hair, nor shape of skull, any racial connection with the Nigritians, who are the pure negroes. The Nubians, or, as they call themselves, the Barabra (Berbers) have to look for their kinsmen in the north and not in the south; the Beduins of the eastern deserts, the

Bisharin and Ababde, resemble them very much. For constancy of types it is sufficient that no noteworthy changes have taken place within historical time. One of the most important anthropological characteristics is the colour of the skin. In the case of the Nigritians this is practically independent of all external circumstances; air and light have no effect upon it; the negro remains black. Among the northern inhabitants there is an important variability of colouring. Light and air exert a considerable influence upon the colour of the skin of the Egyptian and Beduin; the people of Southern Europe also become dark in Nubia, but grow pale again when they leave the latter country. This fact furnishes the explanation of the diversity of colouring found in the old Egyptian pictures, which were painted according to fixed canons, and in which the men appear always dark red and the women light yellow. The prime colour of the one is vermilion, and of the other orange. The former characterises the man working out in the open air, and the latter the woman working in the house and thus preserving her light skin-colour. Greeks of the third generation living in Nubia have to-day already a completely Cushitic appearance. This changeability of the colour of the skin characterises all the peoples as far as Dongola, where the Nigritians first begin, and forms the principal ground for the supposition that the north and south of Egypt never belonged to each other ethnologically, and that the northern races of Egypt have not sprung from negroes. The direct anatomical proof for this assertion cannot, it is true, be adduced, inasmuch as pre-historic skulls have not been found. Craniological studies point to the near relations of the Egyptians of to-day with the Berbers of Morocco and the Guanches of the Canary Islands.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian R.G.S.*)

EUROPE.

Abbate, Enrico.—Guida al Gran Sasso d'Italia, pubblicata per cura della Sezione di Roma del Club Alpino Italiano. Roma, 1888: 12mo., pp. vii. and 224, maps, plans, and illustrations. [Presented by the Author.]

The new railways from Terni to Aquila and Rome to Solmona are bringing the highlands of the Abruzzi within the reach of travellers.

Dr. Abbate has provided for them an elaborate monograph of the mountain group of the Gran Sasso d'Italia, the culminating peak of which, Monte Corno (9584 feet), is the highest summit in the Apennines. The scenery on the inland side is bleak, but the peaks on the Adriatic side rise in magnificent precipices above forested foothills, and retain their snows till late in the summer. The volume contains botanical and geological, as well as topographical notes, and is copiously illustrated with maps, plans, and photographs. The maps are excellent.

—[D. W. F.]

Bridge, John.—From Tilbury to Torbay, 1885-1887. London, Gilbert & Rivington, 1888: 12mo., pp. 154. [Presented by the Author.]

[British Rivers.]—Industrial Rivers of the United Kingdom. By various well-known Experts. London, Fisher Unwin, 1888: 8vo., pp. [10] and 306. Price 7s. 6d. [Presented by the Publisher.]

The rivers dealt with in this volume are the Thames, Mersey, Tyne, Tawe, Clyde, Wear, Taff, Avon, Southampton Water, the Hartlepool, Humber, Neath, Liffey, Usk, Tees, Severn, Wyre, and Lagan. The chapters have been reprinted from the *Shipping World*, and some of the rivers are treated by competent

specialists. The articles, some of them rather sketchy, have evidently been printed without revision, so that some of the statistics are old; but some useful information might be obtained from the volume by those interested in commercial geography.

Burrows, Montagu.—*Historic Towns. Cinque Ports.* London, Longmans & Co., 1888: 8vo., pp. viii. and 261. Price 3s. 6d. [Presented by the Publishers.]

Captain Burrows' study of the Cinque Ports is not only of great historic and general interest, but brings out strikingly the importance of geographical conditions in working out the course of history and commerce. It was the change in geographical position which led to the decay of Sandwich, Romney, Hythe, and the later members of the Cinque Ports, Rye, and Winchelsea, and Captain Burrows devotes an instructive chapter to the physical changes at the various ports. The volume contains four maps, three of them of old date showing the past geographical condition of some of the ports.

[France.]—*République Française. Ministère du Commerce et de l'Industrie (Division de la Comptabilité et de la Statistique). Statistique Générale de la France. Résultats statistiques du Dénombrement de 1886. 1^{re} Partie. France.* Paris & Nancy, Berger-Levrault et Cie., 1888: large 8vo., pp. iii., 150, 331, maps, &c. [Presented by the French Minister of Commerce and Industry.]

[Geodetic Institute.]—*Veröffentlichung des Königl. Preussischen Geodätischen Institutes. Gradmessungs-Nivellement zwischen Anklam und Cuxhaven. Nebst einem Anhang: Höhen über N. N. von Festpunkten der früheren Gradmessungs-Nivellements des Geodätischen Institutes.* Berlin, P. Stankiewicz, 1888: 4to., pp. 92, map and plate. [Presented by the Royal Geodetic Institute.]

Issel, Arturo.—*Il Terremoto del 1887 in Liguria.* Genova, A. Donath [1887]: 8vo., pp. 207, map and plates. [Presented by the Author.]

Labonne, [Dr.] Henry.—*L'Islande et l'Archipel des Færøer.* Paris, Hachette et Cie., 1888: 8vo., pp. xx. and 394. Price 3s. 6d.

Dr. Labonne went to Iceland in 1886 and 1887 entrusted with one of those official missions by the French Government which cost so little and do so much good work. He circumnavigated the island during the two journeys, and landed at Husavik on the north coast and several points on the east coast. Not only so but he crossed the western half of the island in three different lines, and zigzagged about in various directions. Dr. Labonne has considerable scientific qualifications, so that besides giving an interesting narrative, he adds considerably to our knowledge of the physical condition of the country. He also visited the Færøer in the summer of 1887, and gives the results in one of his chapters. There is a good map, on the scale of 1:1,300,000, and various illustrations.

Lebon, André, and Pelet, Paul.—*France as It Is.* Specially written for English Readers, and translated from the French by Mrs. William Arnold. London, Cassell & Co., 1888: 8vo., pp. vii. and 348. Price 7s. 6d. [Presented by the Publishers.]

This volume deals with France in its geographical, political, administrative, ecclesiastical, intellectual, military and naval, legal, economic, and colonial aspects, including some useful statistical information. A brief historical account of the relations between France and England is also given. The volume is illustrated with three maps.

Lund, T. W. M.—*Como and Italian Lake-Land.* London, W. H. Allen & Co., 1887: 8vo., pp. xiv. and 515, maps, plan, and illustrations. Price 10s. 6d.

There is a new class of guide book, written for a new class of tourists, the information of which, so far as it is not conveyed—without acknowledgment—from older works, is confined to means of locomotion and accommodation.

It is a pleasure, among all this modern rubbish, to come on a volume written by a man of taste and intelligence for his fellows. Mr. Lund has thoroughly worked the shores of the Lake of Como, both on the spot and in a library, and has reproduced his information in a scholarly and readable form. On p. 145 and following, will be found an account of some great erratic blocks which have been used as natural monuments by the excavators of pre-historic tombs. A reference to Leonardo da Vinci's singularly full and ingenious notes (see 'Proceedings,' vol. vi. p. 335) might have been made with advantage. The treatment of Como is so satisfactory that Mr. Lund must suffer by being made his own standard. He has treated Lugano and Maggiore but cursorily in comparison, and Iseo and Garda are so superficially noticed that they had almost better not have been noticed at all. Lago di Ledro is not mentioned. Mr. Lund will do a service to travellers if he will work up the other lake shores in the same spirit and detail in which he has treated Como, reserving, perhaps, his chapters on Milan and Bergamo for a separate work. The volume has some excellent illustrations, a sketch map of the Italian, and a large transcript from the old Austrian survey of the immediate shores of the Lake of Como. The last is needlessly large in scale and too limited in extent, even the pedestrian will often find himself beyond its limits.—[D. W. F.]

Marinelli, G.—*Le Alpi Carniche, nome, limiti, divisioni nella storia e nella scienza.* Torino, 1888: 8vo., pp. 91, map.

Russell, [Cte.] Henry.—*Souvenirs d'un Montagnard (1858-1888).* Pau, Vignancour, 1888: 8vo., pp. xx. and 508. Price 5 francs. [Presented by the Author.]

Those who take an interest in the Pyrenees know two names as the leaders of their early explorers—Mr. C. Packe, the author of an excellent guide-book, and Count Henry Russell. The Count, who is half an Englishman, and has wandered in many parts of the world, has at last given to the public, in a collected form, his Pyrenean experiences. He has arranged his ascents and adventures topographically. Consequently his book is at once a guide-book and a narrative. Few, perhaps, will read it consecutively, for mountain ascents, briefly told, are monotonous. But those who want to follow in the climber's footsteps will find a mass of practical and topographical information pleasantly conveyed. And the reader who wishes to obtain definite pictures of the characteristics of the chain will find them here. Count H. Russell has vivid perceptions of nature, and he is not ashamed of his feelings. He not only describes with eloquence and enthusiasm, but his descriptions, unlike those of some enthusiastic writers, are faithful to local facts. He has no pretensions to be a scientific observer, but he has carried to completion a work which may be of great service to such observers by having excavated out of the solid rock 300 feet below the summit of the Vignemale, at a height of 10,820 feet, several caverns which are fitted up as night-quarters. A very curious and exciting adventure with brigands diversifies the narrative of ascents.

Walker, Mrs.—*Untrodden Paths in Roumania.* London, Chapman & Hall, 1888: 8vo., pp. xvi. and 355. Price 10s. 6d. [Presented by the Publishers.]

Mrs. Walker's book is a real contribution to a knowledge of Roumania, so far as the ordinary English reader is concerned, though considerable portions of it have already appeared elsewhere. She traversed many rarely-visited parts of the country, and her observations are specially directed to the people, their condition and history. Galatz and a good many other towns are well described, and there are numerous illustrations. There is neither index nor map.

Ward, C. S.—*Thorough Guide Series. Ireland (Part II.), East, West, and South including Dublin and Howth.* London, Dulau & Co., 1888: 12mo., pp. xvi. and 219, maps and plans. Price 5s. [Presented by the Publishers.]

This volume embraces the whole of Munster, and the greater part of Leinster and Connaught, particular attention being paid to such districts as County Wicklow, Connemara, the coast of County Clare, Counties Cork and Kerry. It contains 24 well-executed maps and plans by Bartholomew.

ASIA.

Burton, Lieut-General E. F.—An Indian Olio. With illustrations from sketches by the author and by Miss C. G. M. Burton. London, Spencer Blackett [1888]: crown 8vo., pp. xii. and 388. Price 7s. 6d. [Presented by the Publisher.]

This is in every way a readable and interesting series of sketches of life in southern India, that will be heartily welcomed, not only by those who had the pleasure of knowing the author as the able and popular Town Major of Kampti, but also by all who have read his delightful 'Reminiscences of Sport in India,' to which it forms a sequel. There are capital descriptions of Madras, Vellore, Trichinopoly, Tanjore, Mysore, Bangalore, Cuddapah, Curnbun, Bellary, Secunderabad, Haidarabad, Kampti, Nagpur, The Northern Circars, and a chapter on Burma. *Shikar* figures largely in the book, as might be expected from the pen of so accomplished and successful a sportsman as General Burton; and on pp. 270-280 will be found an account of the fearful attack by a wounded tiger on Major Holland. General Burton's long residence in India, and his thorough acquaintance with every subject he touches upon, render him perfectly safe as a guide; while the ease and liveliness of his style make him equally charming as an author: and it is to be hoped that he will give us another volume dealing more especially with the geographical features of a region too little known, but with which he is so familiar.

Campbell, [Rev.] W.—The Gospel of St. Matthew in Formosan. Edited from Gravius's edition of 1661. London, Trübner & Co., 1888: 16mo., pp. xx. and 219. [Presented by the Author.]

— The Gospel of St. Matthew in Formosan (Sinkang Dialect) with corresponding versions in Dutch and English, edited from Gravius's edition of 1661. London, Trübner & Co., 1888: sq. 8vo. [Presented by the Author.]

Central Asia.—No. 2 (1888). Further Correspondence respecting the Affairs of Central Asia. [C.—5518.] London, Harrison & Sons: folio, pp. 20, map. Price 1s. 3d.

The map, on a scale of 8 miles to an inch, illustrates the Demarcation of the Frontier of Afghanistan between the Heri Rud and the river Oxus.

China.—Imperial Maritime Customs. 1.—Statistical Series: Nos. 3 and 4. Returns of Trade and Trade Reports for the year 1887. Part I.—Report on the Trade of China, and Abstract of Statistics. Part II.—Reports and Statistics for each Port, with the Reports and Statistics for Corea. Shanghai, Statistical Department of the Inspectorate General of Customs. London, P. S. King & Son, 1888: 4to. [Part I.] pp. 27; [Part II.] pp. vii. and 548, diagrams. [Presented by the Director of the Chinese Customs.]

The total value of the foreign trade of China amounted in 1887 to 188,123,877 Hk. Tls., as compared with 164,685,891 Hk. Tls. of the previous year; the value of the net imports amounting to 102,263,669 Hk. Tls., as compared with 87,479,323 in 1886, and the exports to 85,860,208 Hk. Tls., as compared with 77,206,568 Hk. Tls. in 1886. The total quantity of tea exported from the Treaty Ports was 2,096,097 piculs in 1887, against 2,217,295 piculs in 1886; the assessed value of the export of 1886 was Hk. Tls. 33,504,820, and that of the export of 1887, Hk. Tls. 29,379,838.

[India.]—Account of the Operations of the Great Trigonometrical Survey of India. Vol. x. Electro-Topographic Longitude Operations executed during the years 1881-82, 1882-83, and 1883-84, by Major G. Strahan, R.E., and Major W. J. Heaviside, R.E. Prepared under the directions of Colonel C. T. Haig, R.E., Deputy Surveyor-General, Trigonometrical Branch. Published under the orders of Colonel H. R. Thuillier, R.E., Surveyor-General of India. Dehra Dun, 1887: 4to., pp. xv., 38 (54), 518, chart and plates. [Presented by the Surveyor-General of India.]

[India].—Trigonometrical Branch, Survey of India. Spirit-Levelled Heights, No. 3. Madras Presidency. Season 1886-87. Prepared under the directions of Col. C. T. Haig, R.E., Deputy Surveyor-General, Trigonometrical Branch. Published under the orders of Col. H. R. Thuillier, R.E., Surveyor-General of India. Dehra Dun, 1888: 8vo., pp. viii. and 59, maps. Price 1 rupee.

[Pyrard [of Laval], François].—The Voyage of François Pyrard, of Laval, to the East Indies, the Maldives, the Moluccas, and Brazil. Translated into English from the third French edition of 1619, and edited, with Notes, by Albert Gray, assisted by H. G. P. Bell. In two volumes. Vol. ii. part i. [Hakluyt Society Publication No. LXXVII.] London, 1888: 8vo., pp. xlvii. and 287, plates. [Presented by the Hakluyt Society.]

Russia.—No. 1 (1888). Copy of a Despatch from Sir R. Morier, and other Correspondence respecting attempts to establish Commercial Relations with Siberia through the Kara Sea. [C.—5435.] London, Harrison & Sons, 1888: folio, pp. 6, map. Price 7½d.

Recueil du Turkestan comprenant des livres et des articles sur l'Asie centrale en général et le province du Turkestan en particulier. Composé sous les auspices du Général-Gouverneur du Turkestan, N. O. de Rosenbach, par V. J. Méjow. St. Petersburg, 1888: 4to., pp. vi. and 131.

This is the third instalment of M. Méjow's valuable catalogue, the earlier parts of which were noticed in our Proceedings (N. S., vol. vi. p. 542). This part contains the titles of books and articles comprised in vols. 300-416 of the collection of books, &c., relating to Central Asia and Turkestan formed by M. Méjow himself under the auspices of the Governor-General of that province. The catalogue is systematically arranged, the titles of works being placed in two divisions: (1) Central Asia in general, and (2) Central Asia in particular. These again are grouped under the several heads of history and politics, geography, cartography, history of religion, law, customs, philology, and archaeology. Those parts of Central Asia not subject to Russia, viz. Bokhara, Khiva, Mongolia and Manchuria, Kashgar, Eastern Turkestan, China, Afghanistan, and British possessions are treated of under separate rubrics. There are 1309 titles of works in Russian and other languages in this volume, to which there are three indices: 1, of names of authors, translators, &c.; 2, places and things; and 3, of authors and things comprised in the foreign bibliography.—[E.D.M.]

Sieger, [Dr.] Robert.—Die Schwankungen der Hocharmenischen Seen seit 1800, in Vergleichung mit einigen verwandten Erscheinungen. Wien, 1888: 8vo., pp. 80. [Presented by the Author.]

These papers originally appeared in the 'Mittheilungen' of the Vienna Geographical Society, and the memoir is an important contribution to physical geography and dynamical geology. Dr. Sieger deals first with the Lake Van region, and then with the lakes of Eastern Armenia and Asia Minor. The next section is devoted to a consideration of the probable causes at work to produce the variations of lake levels; these the author considers are specially climatic and glacial. A final section deals with the question of climatic changes in general. Dr. Sieger has brought together for his special purpose many very valuable data referring to changes in the condition of lakes in various parts of the world.

Smith, [Dr.] George.—Stephen Hislop, Pioneer Missionary and Naturalist in Central India from 1844 to 1863. With portrait, [map], and illustrations. London, John Murray, 1888: 8vo., pp. xii. and 386. Price 14s. [Presented by the Author.]

The Rev. Stephen Hislop was one of the most remarkable men of his time in India, having exercised an influence far beyond the range of his mere vocation as a missionary in the Central Provinces, where his tragic death terminated his

long career of activity and usefulness. Born in 1817 at Duns in Berwickshire, he was sent from school, where he came out first in mathematics and classics, at the age of 17, to the University of Edinburgh. After graduating there with the highest honours in Moral Philosophy and Hebrew, and after a course of Divinity at Glasgow University, and a few years work as a tutor, he was sent out to India at the close of 1844 by the Foreign Missions Committee of the Free Church of Scotland as Pioneer Missionary at Nagpur. There he carried on his work with unceasing activity for nearly nineteen years; a full account of this will be found in Dr. Smith's present excellent biography.

Mr. Hislop will long be remembered, not only for his zeal and success as a missionary amongst the Marashas and other civilised races, and the wild hill tribes of Nagpur and Berar, but also for his scientific accomplishments. He was one of the foremost geologists in India, and devoted himself with the utmost enthusiasm to the investigation of the Tertiary and other formations of the Dekhan; his work in this direction being only second in importance to that of his regular calling. He laboured also unceasingly at botany, ethnology, and philology; having been the first to reduce to writing the Gond language, of which he acquired a profound knowledge. He also made a special study of the archæology of the country, and it was, in fact, whilst on an expedition to investigate the stone-circles and mounds of the Nagpur district that he met with his terrible and untimely death. Neither should his services in another direction be forgotten; as it was greatly owing to his correspondence with, and representations to, influential friends at Calcutta that the unsatisfactory condition of civil affairs at Nagpur was superseded by the advent of Sir Richard Temple, whose able and vigorous administration soon put matters to rights in the Central Provinces. Of a very reserved and extremely observant nature, Mr. Hislop always seemed to casual or uncongenial visitors somewhat cold and repellent; but not so to those who knew him well, or who enjoyed any share of his intimacy, for to all such he proved a warm friend. No one could be long in his company without being as much struck by his singleness and goodness of heart, as by his extraordinary mental gifts and attainments.

Strachey, Sir John.—India. London, Kegan Paul, Trench & Co., 1888: 8vo. pp. xiv. and 399, with map. Price 15s. [Presented by the Publishers.]

The present work is an amplification of a course of lectures delivered by the author in 1884, before the University of Cambridge; and it will be found invaluable to all who seek for information about India, embodying as it does the experience and the mature judgment of one who has not only passed a longer career, but who has also had a larger share in the administration of our Indian Empire than most men. The work treats of the constitution of the Government in India and at home; of the army, the finances, and the public revenues; of taxation, foreign trade, and home charges; of public works, the public debt, and famine insurance fund; of the laws and the administration of justice; of education; and of the Native States. There is a particularly interesting chapter at the commencement, giving a general sketch of the peninsula; its division into separate governments; its physical features, area and population; its meteorology and different climates; and, lastly, its geography and great rivers.

There are two leading facts about India that are brought forward with great prominence, and which will come as a surprise to many who have only a slight or incorrect idea of what our Indian Empire really is. The first being, that there is no such country, strictly speaking, as "India"; the second, that we are not *foreigners* there, in the general acceptation of the term; and these two important points cannot be better illustrated than by the following passages:—

"What is India? What does this name India really signify? The answer that has more than once been given sounds paradoxical, but it is true. There is no such country, and this is the first and most essential fact about India that can be learned. India is a name which we give to a great region including a multitude of different countries. There is no general Indian term that corresponds to it. The name Hindustan is never applied in India, as we apply it, to the whole of the Indian continent; it signifies the country north of the

Narbada River, and especially the northern portion of the basins of the Ganges and Jumna. . . The differences between the countries of Europe are undoubtedly smaller than those between the countries of India. Scotland is more like Spain than Bengal is like the Punjab. European civilisation has grown up under conditions which have produced a larger measure of uniformity than has been reached in the countries of the Indian continent, often separated from each other by greater distances, by greater obstacles to communication, and by greater differences of climate. The diversities of language, religion, and race are as wide in India as in Europe, and political catastrophes have been as frequent and as violent. There are no countries in civilised Europe in which the people differ so much as the Bengali differs from the Sikh, and the language of Bengal is as unintelligible in Lahore as it would be in London. . . I have spoken of the different countries of India, but they are not countries in the ordinary European sense. . . In India . . . there are no nations of the modern European type. . . This is the first and most essential thing to learn about India—there is not and never was an India, or even any country of India, possessing, according to European ideas, any sort of unity, physical, political, social, or religious; no Indian nation, no 'people of India' of which we hear so much." (pp. 2-5.)

"Until we rightly appreciate the significance of such facts, we shall, among other things, never understand how our Indian Empire has come into existence, and this vast domain is maintained by a handful of Englishmen. There was never, as Professor Seeley has shown, any conquest of India by the English, according to the ordinary sense of the word 'conquest.' The conquest was rather, to borrow his expression, 'in the nature of an internal revolution,' directed, by Englishmen, but carried out for the most part through the Natives of India themselves. No superiority of the Englishman would have enabled England to conquer by her own military power the continent of India, with its 250 millions of people, nor could she hold it in subjection if it had not been occupied by distinct nations. In the words of Professor Seeley, 'the fundamental fact that India had no jealousy of the foreigner, because there was no India, and therefore, properly speaking, no foreigner.' It is a consequence of all this, that in every great Indian province the political sympathies of large sections of the population towards men who, geographically speaking, are their own countrymen, are often as imperfect as they are towards their English masters. We have never destroyed in India a national government, no national sentiment has been wounded, no national pride has been humiliated; and this not through any design or merit of our own, but because no Indian nationalities have existed. They no more exist in the so-called Native States than in our own territories, and the most important of those States are ruled by princes who are almost as much foreigners to their subjects as we are ourselves." (p. 6.)

In addition to the various subjects already mentioned as being dealt with in the present work, there are three chapters headed, "An Indian Province," in which one of the separate governments is specially dealt with, so as to elucidate all the others; and by adopting this excellent plan, the author has been enabled to give much fuller details, and to convey to the public a far clearer idea of what the country is, and how we rule it, than could possibly have been done by any mere generalisation. The North-Western Provinces and Oudh have been selected for the purpose. They have always been regarded as a pattern of good government, and the author in this case speaks with peculiar weight and authority, having had the administration of their affairs for many years.

[**Western Palestine.**]—The Survey of Western Palestine. A General Index to 1. The Memoirs, Vols. I.-III. 2. The Special Papers. 3. The Jerusalem Volume. 4. The Flora and Fauna of Palestine. 5. The Geological Survey. And to the Arabic and English Name Lists. Compiled by Henry C. Stewardson. Printed for the Committee of the Palestine Exploration Fund by Harrison & Sons, 1888: 4to., pp. 164. [Presented by the Committee of the Palestine Exploration Fund.]

AFRICA.

Böttcher, Ernst.—Orographie und Hydrographie des Kongobeckens. Berlin (Haude & Spener), 1887: 8vo., pp. 100, map and sections.

A careful compilation dealing with the physical configuration of the Congo basin. After a general description of the territories drained by that vast river, the author furnishes a detailed hydrographical account of its course, and of that of its principal tributaries. He pays much attention to the volume and velocity of the river, and gives numerous altitudes, citing in all cases the authorities whom he has consulted. The accompanying map is a mere sketch.—[E. G. R.]

Castagnoso, Michele de.—Storia della Spedizione Portoghese in Abissinia nel secolo XVI. (Traduzione dal portoghese, con commenti), Roma, 1888: 8vo., pp. ix. and 74. [Presented by Count Luchino dal Verme.]

Freshfield, Douglas W.—Ostern in Afrika. I. Die Hugelregion der Küste Kabyliens. II. Der Jebel Jurjura. Separat-Abdruck aus der 'Oesterr. Alpen-Zeitung,' Nr. 253, 254, ff., X. Jahrg., 1888. 4to., pp. 23, map and plate, [Presented by the Author.]

An account of a hitherto undescribed route across the Kabyle Highlands from Bougie by Fort National to Dra el Mizan, and of an ascent of Ras Time-dounin (7556 feet), the second summit of the Jebel Jurjura. Mr. Freshfield also describes a visit to the gorge of the Chabet el Akra, and gives general hints as to the most interesting mountain districts in Algeria.

Kayser, Gabriel.—Bibliographie d'ouvrages ayant trait à l'Afrique en général dans ses rapports avec l'exploration et la civilisation de ces contrées depuis le commencement de l'imprimerie jusqu'à nos jours. Brussels, 1887: 8vo., pp. xv. and 176.

A pretentious work which the author alleges is based upon "notes taken in the principal libraries of Europe, the British Isles and the United States." The bibliography contains the titles of 2276 books, maps and articles, with occasional notes. The classification of these entries is a failure. Misprints abound, and the "indulgence of the learned" which the compiler claims in his preface, is put to a severe test.—[E. G. R.]

[Moloney, Alfred.]—Minute by Governor Moloney, in connection with his visit in April, 1888, to the present eastern limit of the colony of Lagos. Benin River, the Rio Formosa or Beautiful River of the Portuguese, discovered, 1485. [Lagos, 1888]: folio, pp. 9.

AMERICA.

[British Honduras.]—Report of the Expedition to the unexplored Coxcomb Mountains in British Honduras. Belize, Printed at the Government Press, 1888: folio, pp. 31. [Presented by Mr. Gordon Allan.]

Annexed to this Report is a tracing, by Mr. Gordon Allan, the Surveyor-General, of the Coxcomb ranges, showing the tracks which were followed or opened by the expedition.

Bruyssel, Ernest [van].—La Republique Argentine, ses Ressources Naturelles, ses Colonies Agricoles, son importance comme Centre d'Immigration. Bruxelles, Muquardt, 1888: 8vo., pp. 272. Price 5 francs. [Presented by the Author.]

This is on the whole a trustworthy general account of the Argentine Republic, with special information for emigrants. The book seems originally intended to encourage emigration in Belgium.

Collens, J. H.—A Guide to Trinidad. A Handbook for the use of Tourists and Visitors. Second edition. London, Elliot Stock, 1888: 8vo., pp. vi. and 287. Price 6s. [Presented by the Publisher.]

The first edition of this work was noticed in the 'Proceedings' for 1887, at p. 394. The present edition has been revised and extended, and the statistics brought down to 1886. It is fully illustrated, but, unlike the previous edition, contains no map.

Lafone y Quevedo, Samuel A.—*Londres y Catamarca*. Buenos Aires, 1888; 8vo., pp. xv. and 407. [Presented by the Author.]

The present Argentine Province of Catamarca seems, at an early period in the history of South America, to have been designated the jurisdiction of Londres and Catamarca. Signor Lafone has made some researches in connection with this early history of the province, and gives the results in this volume, which is an important contribution to the history of South America.

Lees, J. A., and Clutterbuck, W. J.—B. C., 1887. *A Ramble in British Columbia*. London, Longmans & Co., 1888: 8vo., pp. viii. and 387. Price 10s. 6d. [Presented by the Publishers.]

Phillipps-Wolley, Clive.—*A Sportsman's Eden*. London, Bentley & Son, 1888: 8vo., pp. ix. and 261. Price 9s. [Presented by the Publishers.]

These two volumes are mainly devoted to sport among the mountains of British Columbia. The former relates mostly to the country in the neighbourhood of the Selkirk range, and contains many very good illustrations, which, in conjunction with the text, give some idea of geographical conditions. The book abounds with notes on the natural history of the region, and will of course be of special interest to the sportsman. It contains a fairly good map. Mr. Phillipps-Wolley's book consists of a series of letters mainly devoted to sport. The letters, however, contain some very useful information on the present conditions of life in Vancouver Island, and especially Victoria.

Samanez y Ocampo, Jose B.—*Exploracion de los Rios Peruanos, Apurimac, Eni, Tambo, Ucayali y Urubamba hecha por Jose B. Samanez y Ocampo en 1883 y 1884*. *Diario de la Expedicion*. Lima, 1885: 8vo., pp. 70, map. [Presented by Colin Mackenzie, Esq.]

[**United States.**]—Department of the Interior, United States Geological Survey, Clarence King, Director. *Monographs of the United States Geological Survey*. Vol. xii. *Geology and Mining Industry of Leadville, Colorado*, with Atlas by Samuel Franklin Emmons. Washington, Government Printing Office, 1886: 4to., pp. xxviii. and 770, plates. [Presented by the Director of the Survey.]

[—] [*Tenth Census of the United States, 1880.*] Vol. xvii. *Statistics of Power and Machinery employed in Manufactures*. Prof. W. P. Trowbridge, Chief Special Agent. *Reports on the Water-power of the United States*. Part II. Washington, Government Printing Office, 1887: 4to., pp. xiv., 104, 154, iv., 144, 71, x. and 272, maps and illustrations. [Presented by the United States Government.]

[—] [*Ditto.*] Vol. xix. *Report on the Social Statistics of Cities*, compiled by George E. Waring, Jr. Part I. *The New England and the Middle States*. Part II. *The Southern and the Western States*. Part II. Washington, Government Printing Office, 1887: 4to., pp. vi. and 843, plans. [Presented by the United States Government.]

Wonderland; or, *Alaska and the Inland Passage*, by Lieut. Frederick Schwatka. With a description of the country traversed by the Northern Pacific Railroad, by John Hyde. 1886: 8vo., pp. 94, map and illustrations. [Presented by O. H. Wallroth, Esq.]

ARCTIC.

[**Arctic Regions.**]—Contributions to our Knowledge of the Meteorology of the Arctic Regions. Part V. London, Eyre and Spottiswoode, 1886: 4to., pp. v. and 137. Price 6s. [Presented by the Meteorological Office.]

AUSTRALASIA.

Buller, [Sir] Walter L.—A Classified List of Mr. S. William Silver's Collection of New Zealand Birds (at the Manor House, Letcomb Regis), with short notes on their Geographical Distribution, &c. London, E. A. Petherick & Co., 1888: 8vo., pp. 96, illustrations. [Presented by the Publisher.]

Griffin, G. W.—New South Wales, her Commerce and Resources. Sydney, Charles Potter, 1888: 8vo., pp. 293.

[New South Wales.]—The Railway Guide of New South Wales. (For the use of Tourists, Excursionists, and others). A convenient volume of reference to Railway Routes, Stations, and Places of Interest on the Lines of Railway, containing various maps and numerous illustrations. Third edition. Sydney, C. Potter, 1886: 4to., pp. 148. Price 3s.

[—] Statistical Register of New South Wales, for the year 1887. Sydney, C. Potter, 1888: folio, pp. vii. and 404. Price 9s. [Presented by the N.S.W. Statistical Department.]

[New Zealand]—Auretanga: Groans of the Maoris. Edited by G. W. Rusden. London, Ridgway, 1888. Price 3s. [Presented by G. W. Rusden, Esq.]

Payton, E. W.—Round About New Zealand; being Notes from a Journal of Three Years' Wanderings in the Antipodes. London, Chapman & Hall, 1888: 8vo., pp. x. and 348. Price 12s. [Presented by the Publishers.]

Mr. Payton in his wanderings seems to have gone pretty well round the whole of New Zealand, crossed the North Island in various directions, and made two long excursions into the interior of the South Island. He has visited all the usual sights, and many out-of-the-way places; seen a great deal of the natives as well as of the colonists, and taken a number of excellent sketches, some of which are reproduced here. Mr. Payton's book affords a very fair idea of the present condition of the colony, and is moreover interesting reading.

Queensland.—Norman River Bar (Sir John Coode's Report upon). [Brisbane, J. C. Beal], 1888: folio, pp. 5, plans. [Price 1s. 6d.]

— Geology of the Russell River (Report by Robert L. Jack, Government Geologist, on the). [Brisbane, J. C. Beal], 1888: folio, pp. 5, map. [Price 1s.]

— Coal Discoveries on the Flinders (Report of Mr. Jack, Government Geologist, upon). [Brisbane, J. C. Beal], 1888: folio, pp. 2. [Price 3d.]

— Burrum River (Report by E. A. Collen, Nautical Surveyor, on the). Brisbane, J. C. Beal, 1888: folio [1 sheet], map. [Price 1s.]

— Limestone District, part of the Palmer Goldfield (Preliminary Report by Robert L. Jack, Government Geologist, on). [Brisbane, J. C. Beal], 1888: folio, pp. 2, map. [Price 1s.] [The above Reports were presented by Mr. R. L. Jack.]

Victoria.—Statistical Register of the Colony of Victoria, etc., etc., etc., 1886. Melbourne, R. S. Brain: folio, tables. [Presented by the Government Statist of Victoria.]

GENERAL.

Bourne, H. R. Fox.—The Story of our Colonies. A new and revised edition. London, John Hogg, 1888: 8vo., pp. 394. Price 4s. 6d.

This is a useful compendium of the history, progress, and present condition of the British Colonial Empire. There are six maps illustrating the work.

[The 'Challenger' Voyage.]—Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873-76, etc., etc. Zoology—vol. xiviii. London, Eyre & Spottiswoode, 1888: 4to., pp. viii., ii., and 380, plates. Price 31s. 6d. [Presented by the Lords Commissioners of Her Majesty's Treasury.]

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Galliae Cisalpinæ et Transalpinæ cum partibus Britanniae et Germaniæ, tabula in usum scholarum descripta ab Henrico Kiepert. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Berolini edidit Ditericus Reimer, 1888. 9 sheets. Price 12s. (*Dulau.*)

On this map the marches of Cæsar's legions are laid down, a number indicating the year of Gallic war in which each march was made. Scales of the Roman milia passuum, the Gallic league, and kilomètres are given, together with full explanations of the symbols and system of colouring employed. The map is drawn in a bold clear style, and is well suited for the purpose for which it was published.

ORDNANCE SURVEY MAPS.

Publications issued during the month of November 1888.

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ENGLAND AND WALES: New Series: Sheet No. 217, in outline, 1s.

6-inch—County Maps.—

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(Stanford, Agent.)

ASIA.

China.—Fluss- und Wege-Aufnahmen zwischen Han-kau und Su-tschou. Im Auftrage des Vicekönigs Zo-Zung-Tang ausgeführt von Hermann Michaelis, Ingenieur, in den Jahren 1879, 80, und 81. Nach dessen Originalkonstruktionen im Massstab 1: 100,000 reduziert auf den Massstab 1: 1,000,000 or 13·6 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Ergänzungsheft Nr. 91. 3 sheets. Gotha, Justus Perthes, 1888. (Dulau.)

Cochinchine et Cambodge.—Indo-Chine Française. Par F. Bianconi, Ingénieur-Géographe. Scale 1: 1,000,000 or 13·6 geographical miles to an inch. Cartes Commerciales, Physiques, Politiques, Administratives, Routières, Ethnographiques, Minières et Agricoles, avec Notice Descriptive. 3^{me} Série, Région d'Extrême Orient. No. 2. Publiées par la Librairie Chaix. Paris, 1888. London, L. B. Tamini. Price 5s.

AFRICA.

Alger.—Plan d' —. Agha-Mustapha, publié par Adolphe Jourdan, Libraire-Éditeur. Alger, 1889. Scale 416·5 feet to an inch. Price 7s. (Dulau.)

Wissmann, H., Premier Lieut.—Das Gebiet der Baschilange-Stämme in Central-Afrika. Von —. Scale 1: 1,300,000 or 17·8 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1888, Tafel 21. Justus Perthes, Gotha. (Dulau.)

ATLANTIC ISLANDS.

Boa-Vista.—Carta da Ilha da Boa-Vista (Cabo Verde). Scale 1: 100,000 or 1·3 geographical miles to an inch. Comissão de Cartographia. Lisbon, 1888. (Dulau.)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in September and October, 1888.

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1123	m =	1·08	British islands:—South coast of Ireland to Land's end, showing approaches to Irish Sea and Bristol Channel, 2s. 6d.
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1125	m	= 6·0	Australia, east coast :—Port Newry. Gloucester passage, 1s. 6d.
250 Mediterranean :—Plan added, Cape Bon.			
252 Mediterranean :—New plan, Tabarca.			
672 Africa, east coast :—Plan added, Obiat.			
671 Africa, east coast :—Plan added, Warsheik anchorage.			
143 Red Sea :—Plan added, Khor Ghuleifakah.			
934 Java Sea :—Plan added, Djuana and Rembang roads.			
134 New Hebrides :—Plan added, Mele anchorage.			

(J. D. Potter, Agent.)

CHARTS CANCELLED.

No.		Cancelled by	No.
1676	Plan of Patras roads, on this chart	New plan, Patras roads	1225
2072	Plan of Skiatho harbour on this chart		
373	Goazacoalcas river	New plan, Coatzacoalcas river ..	373
627	Plan of Little Fish bay on this chart	New plan, Little Fish bay	1197
64	Calicut road and Beypore rivers entrance		
		Sacrifice rock to Beypore. Entrance Beypore river	64

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 2006. Scotland, west coast :—River Clyde from Greenock to Dumbarton. 1190. England, east coast :—Trusthorpe to Flamborough head. 1627. England, east coast :—Sunderland harbour. 2046. Ireland, south coast :—Waterford harbour. 2377. Baltic Sea :—Ports on East coast of Sweden. 810. Gulf of Finland :—Hango road and approaches. 438. France, north coast :—Boulogne. 2491. North America, east coast :—Approaches to New York. 1356. Africa, west coast :—Corisco bay. 8d Red Sea :—Sheet 4. 8c Red Sea :—Sheet 5. 744. India, west coast :—Cape Ramas to Alvaqudda. 2570. Eastern archipelago :—Sulu archipelago and the north-east coast of Borneo. 2678. China, Yang-tse-Kiang :—Nanking to Tung-lin. 2695. China, Yang-tse-Kiang :—Tung-lin to Hankau. 2432. Russian Tartary :—Tumen Ula to Strelak bay. 1695a Australia, south coast :—Bass strait, eastern sheet. 347. Australia, east coast :—Percy isles to Whitsunday island. 1460. Arafura sea :—Ports in Arafura sea. 2124 New Guinea, south coast :—Bramble haven to Rossel island.

(J. D. Potter, Agent.)

Quicembo.—Plano hydrographico da Enseada do —, 1888. Costa Occidental d'Africa, Provincia d'Angola. Commissão de Cartographia, Lisbon. Scale 1 : 10,000 or 0·14 geographical miles to an inch. (Dulan.)

United States Charts.—West Coast of Lower California. From a Survey in 1887 by the Officers of the U.S.S. *Ranger*, Commander F. A. Cook, U.S.N., commanding. Scale 1:73,000 or 1 geographical mile to an inch.—Pilot Charts of the North Atlantic Ocean, November and December 1888. Published at the Hydrographic Office, Navy Department, Washington, D.C. G. L. Dyer, Lieutenant U.S.N. Hydrographer to the Bureau of Navigation.

ATLASES.

Fritzsche, G. E.—Nuovo Atlante Geografico con 34 Carte e relativo Testo ad uso dei Licei, Collegi Militari e degli Istituti Tecnici, disegnato da G. E. Fritzsche. Ditta G. B. Paravia e C. (Figli di I. Vigliardi) Torino, Roma, Milano, Firenze. Price 6s. (*Dulau*.)

This atlas contains twenty-four sheets of maps, and letterpress, in which a large amount of useful statistical information is given. The first seven sheets which are devoted to physical geography, are clearly drawn, and contain a much information as could possibly be expected in maps of their small scale. On sheet 9 are shown the means of communication by rail, sea, and telegraph in Europe, as well as with parts of Asia and Africa. Among the maps most worthy of notice is one of the Alps, on which a section is given showing the heights of all the passes, and the depths of the Alpine lakes. Throughout this atlas sections of elevations are given, all the maps are well drawn, and it is admirably adapted to the purpose for which it was published.

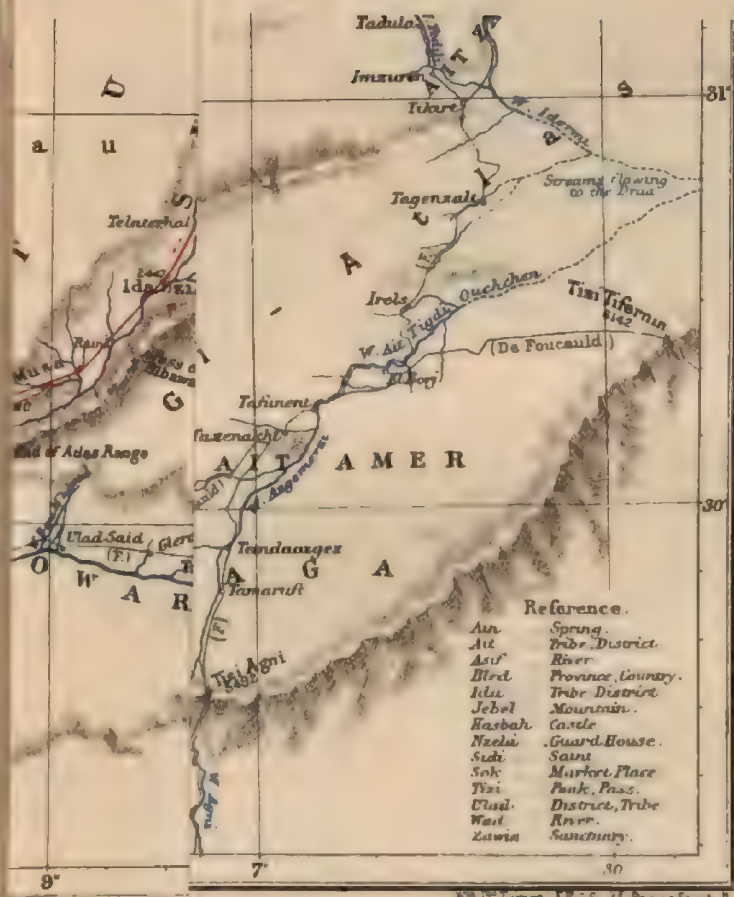
Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von ——. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Nach Erscheinen der letzten Lieferung wird den Abonnenten ein vollständiges alphabetisches Verzeichnis aller im Atlas vorkommenden Namen mit Hinweis, wo dieselben auf den Karten zu finden, zu einem mässigen Preis zur Verfügung gestellt. Zur Abnahme desselben ist kein Abonnement verpflichtet. Die Lieferungen werden in Zwischenräumen von 4 bis 6 Wochen ausgegeben. Sechste (6) Lieferung. Inhalt: Nr. 10, Deutsches Reich, Blatt 1 in 1:1,500,000, von C. Vogel. Nr. 30, Frankreich, Blatt 3 in 1:1,150,000 von C. Vogel. Nr. 41, Niederlande und Belgien in 1:1,110,000, von C. Vogel. Gotha Justus Perthes, 1888. Price 1s. 6d. each part. (*Dulau*.)

United States of America.—Maps showing the Location of the Diplomatic and Consular Offices of —, March 1, 1888. Prepared and published under the direction of the Secretary of State. Washington, Government Printing Office 1888.

In this atlas, which consists of seven sheets, all places where the United States is represented by members of the diplomatic and consular services together with the rank of each officer, are indicated by a system of symbols.

PHOTOGRAPHS.

France.—A series of 44 Photographs of Scenery in the South of France, taken by James Jackson, Esq., of Paris, in September 1888, has been presented by that gentleman to the Map Room of this Society.



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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Journey from Natal to Bihé and Benguella, and thence across the
Central Plateau of Africa to the Sources of the Zambesi and Congo.*

By F. S. ARNOT.

(Read at the Evening Meeting, January 7th, 1889.)

Map, p. 128.

IN 1864, on Livingstone's return from the Zambesi expedition, I was taken, when quite a child, by my parents to witness his distribution of prizes in a school at Hamilton. The impressions regarding Africa which I then received remained with me; and, in course of time, as I was enabled to take a more intelligent interest in the subject, and somewhat to understand the needs of Africa, I purposed to make some effort towards helping her people. Cherishing this thought, I prepared to set out for Africa as soon as opportunity offered, with a view to missionary work among some of the tribes to the north of the Zambesi. I also sought to obtain a little knowledge of such handicrafts as might be useful there.

Having recently returned, after an absence of seven years, I am glad, on the invitation of your Secretary, to tell you what I have learnt with regard to Africans, in whose welfare I am now more deeply concerned; and also to contribute my mite of information regarding the country, and especially of any part not hitherto traversed by Europeans; but I am afraid that my lack of scientific knowledge will make my account a meagre one.

Reaching Natal in September 1881, my intention was to make for the Zambesi, and to follow up one of the smaller affluents, and so get on to the watershed on the north, where I expected to find a mountainous and healthy country which might be made a centre for missionary work. I was not associated with any Missionary Society, and my outfit and resources were very slender. To this fact I perhaps owe my escape from some of the troubles that befall travellers furnished with a large stock of goods. On the other hand, I often experienced necessities that they

are ignorant of, which, however, led to my obtaining a better knowledge of the people.

From Natal I made use of the ordinary means of transport, and reached Potchefstroom in the Transvaal, where it was my good fortune to meet with Mr. F. Selous. I proceeded in his company to Shoshong, the capital of the Bamangwato, and remained there some weeks. As however the travelling season was quickly passing away and the great desert country between Shoshong and the Zambesi lay before me, I had to look about for means to take me thither. Seeing no way of providing myself with a wagon and oxen, I purchased three donkeys and made pack-saddles for them, with the determination that, if no better means of reaching the Zambesi presented itself, I would go on foot. That year the Christian chief Khama had been delayed in sending his hunters to the Mababi, north of Lake Ngami, in consequence of rumours of an attack from the Matabele; but as the dry season had now set in and there was no further news of any invasion from the Matabele, he determined to despatch a company of his men northwards in quest of ivory. Hearing of my intention of going to the Zambesi, Khama kindly offered me the use of his wagon and oxen as far as his men went in my direction. So starting on the 8th of June from Shoshong, we made for the nearest bend of the Botletle river, which as you are aware has an alternate flow—during the rainy season flowing eastward from Lake Ngami, but westward during the early part of the dry season.

The usual route from Shoshong to the Zambesi is via the Tati gold-diggings, along the western border of the Matabele country, and onwards to Panda-ma-tenka and the Victoria Falls. There is also a way called "Khama's route," but this can only be traversed during the rainy season. It being late in the season when I reached the country, I had to take the Kalahari route, which was the one traversed by Mr. Selous and the ill-fated elephant-hunter Mr. French in 1879; but I cannot recommend it.

During this journey the poor oxen were sadly reduced from want of water. The watering places were at great distances, and often there was only sufficient to give the animals one drink. We reached the Botletle river on the 25th June. After resting there eight days, we started again, and passed close by the great N-twe-twe salt-pans, where the overflow waters from Lake Ngami are received and evaporate. At the Tontgaru waters, close by Kama-Kama, on Livingstone's route, we took in our final supply of water, and started across the "thirst-land" for the Mababi flat, passing on the way, traces of the disastrous hunting expedition of Mr. French. The bones of his cattle which had died of thirst, lay in little heaps under the thorn-bushes where the animals had succumbed. After six days of this trying work, finding that the oxen could not draw the wagon further, I sent them on ahead in charge of their driver in search of water, while I and the few men remained by the wagon in the desert.

A few wandering bushmen of the Masaroa race, however, came to our relief, and to their kindness we doubtless owed our lives. Digging pits in the sand they sunk long reeds at the bottom of these, and with an unusual power of suction acquired by long practice, they slowly drew up the water from the sand, discharging it from their mouths into tortoise shells; and so great was our thirst, that we eagerly drank the frothy liquid. Morning and evening we were sustained by a little of this turbid fluid. After two days, however, the oxen returned somewhat refreshed, having found water, and we were enabled to proceed.

Being impatient to reach the river, I went before on foot, accompanied by one of Khama's men, who proposed to lead me to the Mababi river by a shorter route. After travelling through dense forest and bush for over sixteen hours, we saw, glimmering through the darkness, the fires of a few bushmen; and I was indeed glad to lie down and share with them the warmth of their fires and skin coverings, so bitterly did we feel the cold in our exhausted condition. Next morning, the wagon arrived safely, but owing to the prevalence of the tse-tse fly in the country lying between the Mababi flat and the Zambesi, it was not possible for the men Khama had so kindly sent with me to go further; so I had to look out for other means of transport. Going down the river some distance to the villages of the Basubia refugees, I succeeded in engaging fifteen porters. Having loaded the three donkeys, and distributed to these men what things were necessary for a short stay in the Zambesi country, I started on the 31st July to cross that part of the "thirst-land" which lies between the Mababi and the Chobe or Kwando river.

Owing to the dense undergrowth of thorns, we were compelled to travel only in the day-time, and so the small supply of water that my men carried in addition to their loads, soon began to fail. On the fourth day, we had hoped to find water in the Kau-Kong pool, but a troop of elephants had forestalled us, and left the pool as dry as the desert around. My men were therefore obliged to go out in all directions in search of water. One, who made for the dry bed of the Sambate river, met a company of bushmen following on the trail of elephants, and learning of our need, these bushmen guided my man to a spot where he found not only a supply of water for myself and the men, but also sufficient to give the donkeys a drink. Thus refreshed, we were enabled to get over the remaining sixty miles of country, and reached the Chobe river on the 8th of August. We found no people inhabiting those parts, and were entirely dependent for food upon what could be supplied by the few men in my party who were hunters. Large game of all sorts, however, was very abundant, and so we had little difficulty in securing sufficient meat, which we cut up and dried in the sun.

Following the course of the Chobe, I reached Leshuma, one of the late Mr. Westbeech's trading stations, but finding no one there, it was

necessary to proceed to Panda-ma-tenka, and thus we had to return seventy miles into the desert. At Panda-ma-tenka I met Mr. Blookley, who assured me that it was not possible to travel north of the Zambesi without the permission of Liwanika, the chief of the Barotse empire; and I therefore arranged to proceed to his capital in order to procure from him the necessary permission. It took me six weeks to travel from Panda-ma-tenka to Lealui, Liwanika's town, by means of boats which, by his orders, were provided for me at Shesheke. It was slow work proceeding against the current, and provisions were scarce. Many rapids also impeded our progress, and twice the canoes had to be dragged overland, first, past the Nyambe falls, and then, for a longer distance, to avoid the Gonye falls and gorge.

The scenery all the way was beautiful in the extreme, but only on entering the so-called Barotse valley did any native villages appear. For various reasons, the natives avoid the neighbourhood of the river, lower down.

Liwanika gave me a welcome reception; but though willing that I should remain and travel as I liked in his country, he would not allow me to go among the Batonga and Mashashe to the north. Having remained at his capital for five months, I was obliged to return to Panda-ma-tenka to purchase supplies from Mr. Westbeech, and still hoped that a way to the north might yet open. During my stay at Panda-ma-tenka, I took the opportunity of visiting the Victoria Falls in company with Mr. Edward Selous, brother of the famous hunter.

Ascending the Zambesi again to Lealui, to renew my effort to reach the hill country, I determined that if the chief still withheld his permission I would proceed to the West Coast. Liwanika steadily refused to allow me to go among the natives of the hills, whom he called his "dogs," and as I had suffered very severely from fever and ophthalmia, I resolved to leave. During my illness, I had none to care for me but Zambesi natives. The details of the kindness and attention shown to me at that time by one or two poor slave lads are, perhaps, among the most touching and warmest recollections I have of my journeys on the Upper Zambesi. I would also add that all my movements on that river were greatly facilitated by the influence of Mr. Westbeech, the trader, and by the recommendations I received from him to various chiefs.

On leaving Lealui on the 8th of May, 1884, it was my good fortune to meet with Silva Porto, and I accompanied him as far as the Bihé or Oviye country. This renowned and enterprising Portuguese trader and traveller has been to me, ever since, a very helpful friend. In following up the Ninda river in a north-westerly direction, we reached a hilly, bracing country, thickly wooded, and on the 23rd of May we crossed a very long range of hills, and came upon the northern feeders of the Kwando (or Chobe) river, crossing a small stream almost every half hour. Although the dry season was well advanced, and we were

evidently intercepting these streams at points near their source, yet the abundance of water was most remarkable. The natives say that the hills around are of so porous a nature that they absorb the early rains, and only yield their waters to the rivers towards the end of the latter rains. If this be so, it no doubt accounts for the mysterious overflow of the Kwando or Chobe river during the dry season, a matter already brought before the Society by Mr. F. Selous.* I will not occupy time by going into the interesting details connected with the many tribes through whose territory our journey lay. They are all closely allied to the Bambundu family, and are much divided, each village maintaining its own independence. I embraced every opportunity of going amongst them, visiting them in their own villages, and received nothing but kindness and hospitality at their hands.

On arriving at Bihé on the 8th of July, Silva Porto entertained me, and I stayed at his house at Belmonte until October, when I proceeded to the coast, in order to receive replies to letters sent home upon my arrival in Bihé, and also to obtain goods for barter, in view of setting out again for the far interior. Silva Porto also went to the coast, and took steamer to Lisbon.

It will be observed that the foregoing oblique journey across Africa corresponded, on the whole, with that of Major Serpa Pinto, except that it was in the opposite direction, that is, from Natal to Benguella: but in certain parts, as in the Kalahari desert, my route differed from his.

While near the west coast, during my stay at the stations of the American Missionaries, I learned something of the Portuguese and Umbundu languages, so as to be able to communicate with the tribes to the east, by means of native interpreters. Having somewhat recovered from the evil effects of Zambesi fever, I began to prepare for my second long journey, and my thoughts were much occupied as to the route I should take. I wished to avoid, if possible, the country ruled over by the Barotse king, and yet desired to reach the people whom I originally had in mind. The Ovimbundu had spoken of a country called Garen-ganze, and as, from all accounts, it seemed to lie immediately to the north of the Barotse, I thought I would try to reach it. But as to its exact locality, I could get no information, and the name did not appear on our maps.

The country between Benguella and Bihé is occupied by a tribe of enterprising people known as the Ovimbundu. With but little help from Portuguese traders, they make prolonged trading excursions into the far interior, and have done their full share in developing the resources of Central Africa. Lately, owing to the failure of the ivory trade, they have brought to the coast large quantities of rubber, which is extracted from a root found in great abundance over the open plains of the countries east of the Kwanza and the Kukema rivers. These men

* Vide 'Proceedings R.G.S.,' 1881, vol. iii., p. 171.

are the real suppliers of the Portuguese markets at Catumbela and Benguella.

Travelling inwards from the coast through the Ovimbundu country, the road ascends a steep escarpment of the plateau, so that on the fourth day, I reached an altitude of over 4,000 feet, and subsequently over 6000 feet at 100 miles from the coast. This elevation continues eastward with little change—only dipping somewhat as it reaches the valley of the Kwanza—until about 4000 feet is again attained near 20° E. It was a most interesting study, even to so casual an observer as myself, to mark the effect the altitude had on the vegetation. At Benguella, the coast-line is decidedly tropical. The passes through the mountain range that lead to Jisanje are literally blocked with vegetation; the path at some places is roofed over so that the traveller passes through long dimly lighted tunnels at times. The harsh shrieks of gaudily coloured birds of every variety, the chatter of monkeys, and the occasional hoarse bark of the leopard reach his ears. On the fourth day, at a place called Olombinga, his exit is as sudden as it is pleasing from those overgrown tropical passes, and at once the first terrace of the great central plateau is reached. The easterly winds which prevail, come from the far interior—not charged with sand or deadly malaria; but cool and invigorating. The shrieking birds, the monkeys, the huge overgrown cactus-like trees with the baobab, are all left behind. A thin forest of home-like trees, takes their place. The only striking reminder one has of being within some twelve degrees of the Equator is the long colossal grass that covers the more open spaces, and the bright clear sky overhead, and the dark skins of one's travelling companions.

At a point between Bihé and Bailundu, on the Mbulu-vulu flat, we came upon the springs of the Okovango river, which flows southward to Lake Ngami, and close by were springs of feeders of the Kwanza, which flows northwards.

At Bihé I was delayed some time in arranging my loads and procuring porters. Being a comparative stranger to these people, and as they thought I had come from the East Coast, they feared to go with me, lest I should leave them in the lurch, or take them into unknown parts from which they could not again return to their own country; but the chiefs and native traders were my greatest hindrance. Thus I was obliged to start from Bihé in rather an ignominious fashion, with a few women and children carrying my loads a day's march at a time. I thus succeeded in reaching the Kwanza river, and afterwards encamped on the banks of the Kwiba, an eastern tributary of the Kwanza; but it took me about three weeks to transport my few loads over ground which might have been traversed in about as many days. From this point I sent back again to Bihé, and succeeded in engaging, after many delays, a fair complement of men, who came out and joined me at my camp on the Kwiba in the country of the Valuimbe. It is sometimes

called the Ganguella country, but this is merely a nickname given by the Ovimbundu to all tribes east of them, meaning that, according to their ideas of speech, they are "stammerers."

On the 11th of November I started from my camp on the Kwiba with a company of about fifty men, thirty-five of whom were porters employed by me, the rest coming with us on their own account. In a short time we entered the country of the Vachibokwe. Although I had no instruments with me for taking astronomical observations, I noted carefully my route, making use of watch and prismatic compass. About 19° E. long., within the space of a few hours' march, I passed the source of the Kutia, a feeder of the Kwanza; and then the head of the Monyango river, which is the southernmost tributary of the great Kasai; and a little further on the springs which give rise to the Elume river, which flows into the Dun-ge-ungo, a large tributary of the Zambesi. Again, close to Peho I witnessed a similar dividing of the waters. The Lumesa and the Luena, which rise in that neighbourhood, diverge in north-easterly and south-easterly directions, and unite again about 110 miles further east in the great Luvale plain.

Instead of following Commander Cameron's route, which lay along the north bank of the Lumesa, I kept more to the south, and followed for some days the course of the Luena river.

The Vachibokwe people are remarkable for their activity and industry, and command the fear and respect of all native travellers who pass through their country. Their wild independent ways were a constant source of anxiety to me, but personally I suffered no injustice at their hands. These people were the first to discover a method of extracting rubber from the "Talamba" root, which has led to a great improvement in trade at Benguella and other parts; and this shows that these Africans are not altogether incapable of utilising the resources of their own country without the help of Europeans. Large quantities of bees'-wax also are procured by them for purposes of trade.

On leaving the Chibokwe we entered the Luvale country, which is very extensive. Its inhabitants are called the Va-luvale or Va-luena—they themselves preferring the latter name. On the 3rd of December we reached the town of Kangombe, a powerful Luvale chief. He is a little man, scarcely five feet in height, who has perhaps done more in diminishing the once famous Muata-yambo power than any other chief in that part of Africa. He annually collects large bands of followers, and proceeds northwards and westwards to ravage the Lunda country. Those who follow him do so for the sake of plunder alone, and are not subjects of Kangombe when at home. In collecting his raiding parties he has to guarantee compensation to the friends of those who go with him, in case any should fall in the fray. But as he is well supported with guns and powder from Bihé, he is generally more than a match for the Lunda armies. With little loss to his own party he thus usually succeeds in clearing off whole districts every year. Last year he crossed

the Zambesi south of Lake Dilolo, attacked and destroyed that section of the Lunda tribe which inhabits the famous Shinte country. Later on it was my misfortune to follow for some days in the wake of his returning warriors, and to witness the horrors connected with African slave-raiding, such as have been often narrated. Although Kangombe had passed along that road six days previously, I found that some of his victims, who had been left to perish, were still in life; some were tied to trees with bark cords, others were mutilated and partly torn by wild animals.

Passing along the Chongo river, I crossed the Lumese close to a small lake known by the name of Kalundu water, and entered on the great Chifumadshi (or Kifumadji) flat, which Commander Cameron heard of, but understood to be a lake. It is, however, really an immense sandy plain, flooded to the depth of two or three feet during the rainy season; but the water speedily drains away and leaves a dry arid plain in winter. For opposite reasons, many native travellers avoid it in both seasons. When I crossed, we had to wade through shallow water for more than five days, sleeping at night on the ant-hills. As heavy rains were falling at the time, I and my men suffered considerably from the wet and exposure. Game was fairly plentiful all over that country. At this point, however, I met with a gun accident which blew off the end of one of my fingers and prevented me from continuing to assist my men by supplying them with fresh meat. On the 18th of December we passed Lake Dilolo, and the Lutembua river on the 19th, and camped close by the town of Katema, a friend of Dr. Livingstone's, and now quite an old man, who received me warmly and at whose place I remained for a few days. Continuing eastward, we passed through a most interesting country, intersected in all directions by full and rapid streams of water. On the 29th of December we crossed the Luvua and camped at the town of the female chief Nana Kandundu. Many of my porters here determined to leave me. For some time they had been showing constant signs of discontent. Three of them deserted me in the night-time, but, strange to say, took nothing with them, leaving their loads and even their pay behind. The poor men were evidently homesick, and longed to return to their villages and friends. At one place all came to a dead stop. Some were willing to go on with their loads, but the malcontents marched through the camp, armed with leather thongs, threatening to flog the first man who lifted his load. Failing myself to bring them to reason, I left them to settle the quarrel between themselves. I had not gone far, however, from the camp, when, on turning round, I noticed quite a commotion among my men. They were busy getting their loads on their shoulders as quickly as possible, and hastened out of the camp. I afterwards discovered that the secret of their sudden departure was the appearance of a swarm of army ants that had come to my rescue. The poor men rushed off, struggling to hold

their loads on their shoulders with one hand, while they picked off the biting creatures with the other.

At Nana Kandundu, I paid off nearly all my men, only eight porters being willing to proceed with me. The chieftainess kindly provided storage for what goods I was unable to take on. I may say, in passing, that she faithfully guarded fifteen men's loads until I was enabled to send back for them from the Lualaba river. From this point, we journeyed for fourteen days in an easterly direction, through the beautiful but deserted Lunda country. On all sides there were large clearings where villages had stood at a very recent date, but now no people were to be found. As it was late in the season, and the streams were full, I thought it best to keep well to the north, so as to cross the Zambesi tributaries at points near to their sources. As the streams became smaller in volume, my course lay to the south-east, and while travelling in this direction, I sighted the great Zambesi river in the distance, at about 24° E. long., flowing almost due west. A little further on we crossed a flat elevated country, the drainage of which was uncertain, but soon we struck the Lokoshe river flowing northwards. The mountains to the south of the Zambesi were still in sight. To the south-east lay a prominent mountain which I call for my convenience Border Craig, as it evidently divides the basins of the Zambesi and the Congo. The Zambesi seemed to take its rise to the south-east of my route, and at no great distance, I should think, from the sources of the Lualaba and Lufira rivers. My course was then more or less impeded by heavy streams of water all flowing northwards. The Lokoleshe, Lufupa, Luburi, and Lulua were all large streams over which we had to make bridges. At last we entered the beautiful valley of the Lualaba river. The Lunda country which we had traversed is decidedly hilly, but the country in the neighbourhood of the Lualaba is mountainous. I crossed the Lualaba at the town of Kasembe, a chief who bears the same name or title as the famous potentate mentioned by Livingstone, whose town is close to Lake Moero. Hereabout the river varied in width from 120 to 180 feet. The people received me gladly, and at once messengers were sent ahead to inform the great Msidi of my coming. We had not proceeded far when we were met by companies of people sent by the chief to welcome me, bringing with them food in abundance and hearty invitations to his country. My first halting-place was at the town of Molenga, a nephew of Msidi. He showed himself greatly pleased at my having come to his country, and sent some forty basketfuls of provisions to our camp—much more than my men could eat for many days, so that we had to distribute his bounty amongst the people of the country. Leaving this man's town we passed the famous Sombwe mountains on our left, which contain perhaps the most curious cave system to be found in Africa, and are frequented by a section of the Samba tribe.

Crossing the Lukuruwe river, we entered on a very rugged moun-

tainous country, the passage of which tired my porters greatly. We then camped on the banks of the Uleya, where I had to await Msidi's orders before going on to his capital. Msidi is called by some travellers Msiri, but it may be remarked that there is much difficulty as to the spelling of African names. The Portuguese have adopted their own orthography, and the Germans theirs, while some follow the phonetic rules laid down by missionaries in other parts of Africa. Travellers, again, sometimes take their pronunciation of names from natives of different tribes, amongst which there is also very great variation. The consonants *l*, *d*, and *r* are very often interchanged, some of the tribes having a difficulty in pronouncing these sounds. It is also easy to discover from names given to certain places by travellers, from what tribes they had taken their carriers. For instance, Livingstone travelling with Makololo men, called the Ovimbundu traders "Vambadi," a nickname, meaning in the Umbundu language "white man's slaves." Silva Porto travelling with these Ovimbundu calls the Zambesi river the "Liambai." Commander Cameron, travelling westwards from Kasongo's country in company with Ovimbundu traders, calls the Kasai river the Kassabe. The names thus used are not known to the aborigines of the country. Then, again, many wrong names have been inserted in maps because the traveller has not understood the language of the people. Thus a stranger passing through Bailundu enquires the name of the chief's town standing on a prominent hill, and the natives reply "Kom-bala," which simply means "At the capital." But the actual name of the town is Bailundu, from which the whole country ruled over by that chief takes its name. This may account for differences in spelling which I have ventured to make, although I am far from perfect in my knowledge of African languages.

Msidi in due time sent out messengers with a hearty welcome to his country. At that time some half-caste Arab traders from Zanzibar were at his capital, and these men did all they could to prejudice the chief against receiving me. One of them had favoured him with a long harangue, black-balling all Englishmen, and concluding with an earnest appeal to murder me or order me to return. Msidi, however, replied, that as he did not know Englishmen, having never seen one before, he could express no opinion as to the charges the Arab had brought against me; but "one thing I know," said he, "I know you Arabs"; and so, taking into account the character of my accusers, he was content to suspend judgment upon me.

I was asked to go into a sort of quarantine for six days, during which time the chief called upon all the doctors and diviners of the country to perform certain tests and ceremonies, by way of proving to the satisfaction of the people, whether my heart were as white as my skin. These tests were of a simple character. Decoctions of medicine were prepared, into which little bits of bark or wood were placed; and, next

morning, if the bark or wood appeared unchanged, it would be judged that the heart of the visitor was sound; but if it showed signs of decay, the heart of the visitor was not to be trusted. Another ceremony was the cutting off the head of a live fowl, and letting it struggle in the centre of a yard. The attitude of the dead fowl was then carefully observed by the bystanders; and if its bleeding neck had pointed in the direction of my camp, it would have shown that I had treacherous designs. All the tests, however, turned out in my favour. They had nothing against me *internally*; so the chief ordered that the whole country should collect, and give me a hearty and unanimous reception. On the day appointed I was led down by one of the officers of the court and conducted through crowds of people, who saluted me in military fashion, and at last I was presented to Msidi, sitting in the centre of a large court surrounded by his five hundred wives.

It is interesting to note, with regard to these five hundred wives, that they are really Msidi's officers of state. He has divided his great empire into many sections, each of which is ruled by a minor chief, who receives from him an Omande shell as a sign of office; and each of these is represented at court by one of Msidi's wives, by whom all tribute is collected, and all visitors to the capital are entertained. By this simple, but original plan of his own, Msidi, without books or secretaries, rules the whole country most effectively, and his name is everywhere feared.

At Garenganze, the chief told me of the visits to his capital of the travellers Reichard and Ivens, and you may like to hear his version of their visits. The first gentleman, Msidi said, did not place much confidence in him, nor receive much in return. While professing to be a peace-loving traveller, and not on any political errand, Herr Reichard, being impatient to leave Msidi's country, offered to assist him in his war against Katapona, and suggested carrying that chief's town by assault. Msidi, therefore, came to the conclusion that Herr Reichard's mission was not a peaceful one; and he kept a secret watch around his camp night and day, until at last the strain grew so great, that Reichard was alarmed, and took a hasty departure. Señor Ivens came to Garenganze from the south, and requested thirty carriers from Msidi to assist him and his fellow-traveller, Señor Capello, in their journey across the continent. The chief was slow to provide men for a journey to the east, as he said there was little chance of their return. Señor Ivens could not remain longer than a few days, as his companion was in poor health, and he left, as Msidi thought, rather hurriedly. I had the pleasure, however, of bringing home with me a letter of explanation from Msidi to that gentleman.

Though the two explorers I have referred to both visited Msidi, they approached his country by routes quite different to that which I took—Reichard from the north and Ivens from the south, while my approach was from the west.

I previously referred to the fact that the name "Garenganze," although familiar in Benguella, did not appear in our maps, and was unknown to us. It is really Msidi's own designation for the kingdom which he has created. The Arabs retain the name Katanga, and by that name Garenganze is known on the East Coast. It was towards Katanga and the sources of the Lufira that Livingstone's steps were directed when death overtook him at Chitambo's, on Lake Bangweolo. The seat of Msidi's kingdom is really to the north of Katanga, in a part of the country called by the natives Sanga.

Some thirty years ago Sanga was ruled by an old chief; and Msidi's father, who was a copper trader from the Unyamwezi country to the east of Lake Tanganyika, and frequently visited Sanga, became his friend. On one occasion Msidi took a trade journey, instead of his father, and found this old chief at war with the Baluba, who were invading his country from the north. Fire-arms were then unknown in that region, and Msidi, having four guns in his possession, gained a victory for the Sanga chief, the Baluba taking flight after a few shots were fired. Out of gratitude, the old chief made Msidi his heir, and at his death, not long afterwards, he succeeded him. Being an able man, Msidi made the most of his new position, killing any chiefs who were likely to be rivals, and carrying on aggressive warfare against the surrounding tribes, so that gradually his dominion spread, until now it is of very great extent, and it is still increasing. England and Wales would, I think, be easily contained within it. In former days the Kazembe of Lake Moero was the dominant chief of that part of Africa, but he was obliged to yield to Msidi, who burned his town and carried off his goods. During my stay at Msidi's, a son of the great Kazembe, Livingstone's friend, was executed, many charges of unfaithfulness having been made against him. At first Msidi pardoned him, but as the charges accumulated, he was obliged to give him up to his accusers.

In consequence of Msidi's many conquests, the remnants of various tribes are gathered into his kingdom; and he has also with him a good many of his own people—the Unyamwezi. Towards all, he endeavours, in a crude way, to administer justice; and constitutes himself the defender of those who yield to him entire submission. War parties are constantly sent out to attack any neighbouring chiefs who seek to assert their independence. As a result of these expeditions, large numbers of slaves are brought to Msidi's capital. These are sold by their captors to Arab and Zanzibari traders, as well as to the many native traders who come from Bihé, and from the countries of Zumbo, Vabissa, Malungu, and Uganda. The large quantities of ivory, copper, salt, and slaves that these Garenganze people have for sale, makes Msidi's town a most important market.

The capital is an immense inhabited plain, called by the people Mukurru, or Mukurru oa Unkeya. On two sides there are high

mountains, which I have not ventured to ascend; and to the north extends a vast plain, reaching nearly as far as the eye can see; and beyond this plain the rivers Lukuruwe and Lufira unite. At the south of the plain there is a double-topped hill, around which Msidi's town is clustered, one might say, in numberless villages. Msidi thinks it far beneath his dignity to dwell in a fenced city; but he has a circle of stockaded towns round the limits of his territory, held by his brothers or other relatives. The boundaries of his kingdom, speaking roughly, are—the Lualaba river on the west; the Luapula on the east; southward, the Mochinga or Loënga mountains, separating the Zambesi and the Congo water-systems; and to the north, the Luba country in which are Lakes Lupemba and Moero. Chiefs living beyond these limits yield a certain degree of submission to Msidi. When I was at Garenganze, two companies came to visit him from the Mashukulumbwe tribes on the Kafukwe river. Others from the neighbourhood of Lake Tanganyika, from the Luba country as far north as the late Kasongo Kalombo's capital, and from the Luvale country to the west, bring presents, and seek Msidi's friendship.

To return, however, to my narrative: Msidi consented to my proposal to remain at his capital. He also allowed the few men who had accompanied me to go back, with the understanding that they might act as guides to any friends who wished to join me in establishing a mission station at Mukurru, as I thought it possible that one or two might come. These men were fortunate in meeting, at Bihé, with Mr. Charles Swan, of Sunderland, and Mr. William Faulknor, of Canada, who made a successful journey last year to the Garenganze country, following the route I had taken, and occupying little more than three months in travelling from Bihé to the Lualaba river.

After two years' residence at the Garenganze capital, and having stayed some time to introduce Messrs. Swan and Faulknor to Msidi and his people, I, early this year, set out for the West Coast.

In order to avoid the depopulated country west of the Lualaba, where both my friends and myself had suffered from want of food in journeying inwards, I struck more to the south, and, for some time, kept near to the Zambesi at the first part of its course, which is not marked on any maps that I have seen. The river here runs westwards, and is of considerable volume, too wide and deep for crossing by bridges or fords, wider indeed than the Lualaba at the part at which I crossed that river. The natives use canoes for crossing and other purposes. Livingstone traces the sources of the Zambesi to Lake Dilolo and the country immediately to the north and east, but he also marks on his map the Leeba as a tributary running, according to native report, south-west from a hill called Kaomba. But his "Leeba" is really the Zambesi, and Kaomba is doubtless the remarkably prominent hill which I have called "Border Craig," as dividing the basins of the two great African

rivers which seem to take their rise in that neighbourhood, and flow very circuitously, the Zambesi to the east, and the Lualaba (or Congo) to the west coast, though the Lualaba has also other important affluents.

On my way to the coast, I met in Bihé a company of traders who had just come from the Barotse; and on enquiry I found that they had a packet of letters from M. Coillard, the French Missionary, who, with his heroic wife, is holding his position in the centre of the Barotse valley; but, as might be expected, he and his party have suffered great trials from the constant warfare going on among the Barotse, as well as from the unhealthiness of the climate.

As you may be aware, letters have recently come from Mr. F. C. Selous, my former travelling companion, telling of his unsuccessful effort to reach the Garenganze directly from the south, after he had heard that I had found my way there. Seeking to avoid the hindrances he would surely have met with in the Barotse valley, he endeavoured to get northward from a point lower down the Zambesi, intending to cross the Kafukwe river, and make his way to the west of Lake Bangweolo. He, however, met with worse treatment from the Mashukulumbwe than he would have received among the Barotse, for besides losing everything he narrowly escaped with his life. Perhaps if he had taken an intermediate course between these two countries, he might have been successful.

In conclusion, I may say that the object I had in going to Africa, viz. to establish a station in a healthy part of the interior, was accomplished after seven years. Although I travelled without a white or even a black companion, and with no body-guard or show of arms, I never received any ill-treatment. Guns were carried by some of the party for hunting purposes, but I was generally careful to keep them out of sight during the day, a fact which the natives were not slow to notice. Repeatedly they expressed their joy and satisfaction at the way I had treated them by coming amongst them with "open hands." Difficulties of course arose from time to time by the way. My porters sometimes got me into trouble, and mistakes were often made by myself; but every difficult case that arose I referred to their own native tribunals, demanding justice from them; and without a single exception I received nothing but just and fair treatment. Let me also add that, from the Portuguese at Benguella, I invariably experienced gentlemanly consideration. Though tariffs are heavy at their port, I yet found traders always moderate in their charges.

Having been chiefly occupied with African *people*, my attention was comparatively not much given to the country through which I passed; but I shall be pleased to give any information within my power in answer to questions.

After the paper,

Rev. HORACE WALLER said that Mr. Arnot had followed in the footsteps of Livingstone, and was the first white man who had left a good impression in a

portion of Africa of which previously but very little was known. It was quite certain that any other Englishman who went there would be well received. It would be remembered that Livingstone died with a fixed geographical idea regarding the sources of the great African rivers upon his mind, namely, that within measurable distance of Lake Bangweolo to the westward, four rivers took their rise in one hill and flowed to the four different points of the compass, and it was to be regretted that Mr. Arnot had not been able to explore the country a little further to the south, because there appeared to be such a "clamjammery" (to use a Scotch expression) of rivers taking their rise there that probably he might have been able to solve the difficulty. Mr. Arnot had been on what might be described as the slavery-shed of Africa. He found the miseries of the people intensified by contact with the Arabs from the East Coast, while the great chief Kangombe derived his muskets and means of devastation from Bihé, a Portuguese settlement on the west. In these days some people believed that everything belonging to the Arab power at Zanzibar must be upheld through thick and thin, and that the great object of England and Germany should be to keep Zanzibar in an intact state; but there were others who would be rather glad when that great machinery for devastating Central Africa came to a stop from grit in its bearings. There was a slave trade also carried on, under the euphemistic name of Free Labour, with San Thomé and the Island of Príncipe, which belonged to the Portuguese. It should be clearly understood whether places like Bihé, belonging to the Portuguese, stimulated the slave trade in the interior, and whether places like Bangweolo were under the evil influences of the slave traders of Zanzibar. He hoped that Mr. Arnot would give further particulars about the new indiarubber trade on the West Coast. The fact that the rubber was derived from the root of a plant was extremely interesting from a commercial and botanical point of view.

Colonel GRANT said that according to the description Mr. Arnot had given of the upper part of the Zambesi, that region resembled very much in beauty of character the country around the Nile as it left Victoria Nyanza. The banks were wooded, the stream was rapid, and the course was rocky. Katanga, or the copper country, had been mentioned. On his (Colonel Grant's) way in from Zanzibar he met with natives of the Wanyamwezi country, some of whom had travelled and were very intelligent. When crossing a desert at the bend of the Nile between Abu-Hamed and Korosko, he said to one of them, "Did you ever see such an extraordinary country as this?" "Yes," he said, "down at Katanga, the copper country. There are great caves there, so high, that if I were riding on this camel I could not touch the top with my spear." He was then asked how long they were, and replied, "It was four hundred yards wide, and took us from sunrise till noon to march through it, and you come out of the hill on the other side." It seemed incredible at the time, but Mr. Arnot had seen the caves. That showed how faithful natives were when they were trusted, and how they described things exactly as they saw them. Mr. Arnot informed us that when Livingstone's body was taken from the place at which he died the chief allowed his faithful followers to carry it away on the promise of a reward, but complains that this promise had not been kept. Mr. Arnot was quite prepared to proceed to that country again and deliver whatever gifts might be entrusted to him, so that the name of England and the credit of Livingstone's men might be upheld.

Mr. R. N. CUST said that Mr. Arnot was a stranger to the Society, but some of those present had watched his progress for the last seven years. About five years ago he (Mr. Cust) sent the first notice of Mr. Arnot's existence to the 'Proceedings' of the Society, in which he said there was a young fellow named Arnot walking across Africa on his own resources. Mr. Arnot had the two great characteristics of

a thorough African traveller—pluck, and kindness to the natives. He must have had many a disagreeable quarter of an hour during those seven years, prostrated with fever, suffering in his eyes, wanting food, often within a few inches of losing his life, but his British pluck carried him through. In his kindness to the natives he was only equalled by the Society's gold medallist, Mr. Joseph Thomson. The natives found him to be their friend, and they still possessed that nobility of character which recognised a man who was good to them. In March next he was going back to Africa in the strength of an evangelist, and would take with him the best wishes of the Society.

Sir FRANCIS DE WINTON said that even from a merely travelling point of view Mr. Arnot had accomplished a most remarkable journey, considering the limited means he had at his disposal ; but he had also added to geographical science. Mr. Waller had mentioned Dr. Livingstone, and the four rivers which were mentioned in his journals, because he was then trying to trace out the sources of the Nile, and was impressed with the words of Herodotus who had stated that he had learned from the Chaldean secretary of the city of Sais that the Nile rose in a hill from which two streams ran north, and two south. Livingstone mentioned the springs at Katanga as probably being those which were alluded to by Herodotus ; but as far as could at present be gathered they were at Wady Halfa, at the first cataract. With reference to the slave trade, that question did not yet seem to be thoroughly understood in England. There were two kinds of slavery, and that could not be too often insisted upon. There was the slavery connected more or less with the interior trade, and the domestic slavery which existed throughout the whole of that part of Africa, and which it would be impossible to abolish. The domestic slaves were not badly treated. He knew from personal knowledge that many of them became great chiefs in their turn. They were the property of their owners, and those owners looked after them. It was the other kind of slave trade which it was desired to stop. Blockading the coast and bombarding peaceful villages was only like scratching the surface. The true secret was to attack the trade in the centre of the country, and by making friends with the great chief Msidi, Mr. Arnot was doing something towards putting a stop to the inhuman traffic. It was an important fact that he had made the name of Englishman respected wherever he went. The natives were just like children, and when once their confidence is gained they would do almost anything.

Questions were asked by members as to the animal life, whether it was plentiful or scarce in the country where Mr. Arnot had lived ; and what he regarded as the real cause of his success, and of the kind reception he had everywhere met with.

Mr. ARNOT (in reply to the various questions), said he was quite aware of Livingstone's theory of the existence of three fountains, and when he followed up the course of the Zambesi his travelling instincts would have led him to continue in that direction, but he was unprovided with proper instruments for taking observations, and did not think it worth while to go, leaving it for some other time. He felt that he was only a young man serving an apprenticeship at that sort of work. From enquiries that he had made, however, he gathered that the Lualaba and the Lufira had their rise at practically the same place, with only a very short stretch of open, dry, woody country between, and certainly the Zambesi had its rise in the same neighbourhood. That would account for the three fountains. The Zambesi flowed first north, then south, then west, then east ; while the Lualaba and Lufira only diverged a little, one to the east and the other to the west, and then met again and joined the Luvwa, which was the name for the lower water of the Lualaba. As to the slave trade, it was very difficult indeed for him to commit himself in any way with regard to the deeds of any particular nation or person ; but he was sorry

to say he had seen a great deal of it. The Arab slave-dealers purchased a great many slaves from Msidi's warriors. That chief himself did not sell slaves, and in fact said he was decidedly opposed to the practice. He had seen him redeem slaves from his own warriors. It was an understood thing in Africa that the spoil was to the strong, and that those who fought the king's battles should keep all they could capture. The West Coast trade was chiefly carried on by the natives of Bihé. The Portuguese did very little trade in the interior. They sent off the natives of Bihé with cloth, guns, and other things, and the people in exchange for these brought ivory, slaves, rubber, or anything else with which they could barter. Many of the traders went to the Lunda country, where there was no ivory, and there the people who desired to possess cloth, sold slaves, who were carried away to the lower Kasai country, and exchanged for ivory. But the people of Bihé were only under nominal subjection to Portugal. The Portuguese had no administrative power there. Silva Porto was the honorary Resident, but he had no force behind him. He was a man well disposed, as were many other Portuguese. They would try to do well, but they lacked the power. Some individuals, however, actuated by avarice, did a great deal in encouraging the slave trade. He could not presume to say that that was encouraged by the Government, and he hoped he should in no way be misunderstood in what he had said. In the first year he was in Garenganze, one caravan of Arabs led away over 300 slaves, nearly all full-grown men and women. Children were of little value, because they were unable to endure the fatigue of walking to the coast. As to the Utalamba rubber he was sorry to say that he had lost the few specimens he had. The root from which it was obtained was wiry, and the leaf grass-like. The Vachibokwe race noticed years ago that this root had a sticky gum in it, and they took quantities of it down to the coast and tried to sell it. The Portuguese would not have it at first, but at last they found out its value. With regard to the great Sombwe caves, he went out of his way for some days in order to visit them. The mountain range was very precipitous on one side, and when at a distance his people pointed out to him a great number of holes dotted all over it, like rabbit warrens, and stated that the natives used the caves for refuges, living around the mouths, where they had millet-gardens. They possessed such perfect retreats that Msidi, whose dominions extended all around them, could extort no tribute from them. The people were very shy, and when first he tried to visit them he could only get at two or three at a time. A month or two afterwards he returned and got up a hunt in the district. A river running close by afforded any amount of game. Having shot two hippopotami and twenty antelopes he sent a message inviting them to the feast. One hundred and fifty came out and camped with him for seven days, during which time he fed them, and gave them as much meat as they could carry away. He found them a very peace-loving people, never accustomed to fighting, but always running away. He hoped to spend many happy days among them in the future. The inside of the caves had the appearance of pumice stone, and there were evident traces of strata of limestone underneath. One of the caves had two mouths, the distance between the two openings being five miles. It was called the Kalosa cave, and the natives said there was running water inside. He did not go as far as Chitambo in the Ilala country where Livingstone died, but he met with a man from that country who told him of Chitambo's great complaint that he had never received any reward for permitting the body to be taken away. According to native law, all the belongings of a man dying in a country go to the chief, and Chitambo only allowed the servants to take away Livingstone's things on the understanding that at some time the English people would send a present to him by way of remuneration for his kindness. The man said that Chitambo was disgusted, and regarded Livingstone now as nothing but a common man. He

(Mr. Arnot) did not know if Chitambo was yet alive, but had every reason for supposing that he was. Very few animals were found in the West Central parts of Africa, and certainly none of the larger kinds, but as soon as the Lualaba was crossed, elephants, buffaloes, and antelopes, common to South Africa, were met with in great numbers. There were no giraffes or ostriches. The antelopes were, like the people, driven into the interior, and massed in that central part of the continent. With regard to the secret of his own success, he wished to use the words of one of England's worthies, George Herbert, who in his "Thanksgiving" said, "If they give me honour, I shall let them see that all the honour doth belong to Thee." The one reason for his success in Africa was the reality of the presence and power of God with him night and day.

The PRESIDENT expressed the thanks of the Society to Mr. Arnot for his interesting account of his journeys across Africa. That account, which in due time would appear in the 'Proceedings,' would, he had reason to believe, not be the only exposition of his experiences, for he understood that further details would be published, and he trusted that the valuable ethnographical information he had collected as to the distribution of the races, and the distribution of the power of the various chiefs, would be placed on record in a manner which would make it available for future travellers in the same country. He would add, on behalf of the Council of the Society, that the suggestion of Colonel Grant as to the propriety of endeavouring to make some sort of present to the chief who assisted in the removal of Livingstone's body (if such a person now existed) would not be lost sight of.

Further Exploration in the Regions bordering upon the Papuan Gulf.

By THEODORE F. BEVAN.

IN November and December 1887 I revisited the rivers in the Papuan Gulf, of which I gave an account in the paper published in 'Proceedings of the Royal Geographical Society' for October 1887. To the enterprise and liberality of the Chambers of Commerce of Sydney, and Townsville (Queensland), also to Lord Brassey, Messrs. Burns, Philp & Co., Mr. E. C. Merewether, Sir Edward Strickland, and other Sydney friends, I was indebted for material assistance in organising this further expedition.

No suitable shallow-draught sternwheel steamer being available, I had to chance the risks inseparable from conducting such an undertaking in a small open "deep-keeled" steam-launch (42 feet over all by 8 feet beam and 6 feet draught), for the loan of which I was indebted to the Hon. Sir Henry Parkes on behalf of the New South Wales Government, of which he is Premier. In order to give me an opportunity of having my previous discoveries officially authenticated, the Hon. Sir Samuel Griffith, on behalf of the Queensland Government, kindly placed the services of a licensed surveyor, Mr. H. J. Hemmy, at my disposal; and furthermore, allowed the Queensland Government steamer *Albatross* to tow my launch *Mabel* across from Thursday Island to Deception Bay, New Guinea.

In August I was quite ready to make a start, knowing that after December at the very latest the rainy season would for a time preclude

exploration. An unforeseen difficulty, however, in reference to the transit of the launch up the Australian coast, caused a most provoking delay, and it was not till the end of October that the *Mabel* arrived at Thursday Island *en route* for the Papuan Gulf.

Representations were then made to me on all sides of the advisability of postponing a start till *after* the rainy season, but such a course was rendered quite impossible, owing to the prior engagement of a crew and the position of the launch. There was accordingly no option left but to continue at all hazards, curtailing the objects of the expedition to a re-survey of the rivers, and the gleaning of additional information about the great delta region before referred to.

On 1st November, 1887, the *Albatross*, with the *Mabel* in tow, steamed out of Port Kennedy (Thursday Island), shaping a course north-easterly across Torres Strait. The monsoon periods as affecting the southern coast of New Guinea may be divided into two seasons, viz. prevailing winds from the south-east or on to a lee shore, from May to October inclusive; and from the north-west, or off the land, from November to April, the latter rendering the Papuan Gulf as a general rule smooth as a millpond.

The periods, however, are somewhat variable. On the morning of Saturday, November 5th (when Cape Blackwood was sighted at daylight), a fresh breeze from the south-east caused lumpy water on a line of three fathom soundings off that point, but a more easterly course provided a five-fathom channel, which kept the same depth right into the estuary of Bell Sound; and the very precarious work of towing the little launch across the open sea was thus completed in safety.

In addition to Mr. Hemmy I had engaged the services of three Europeans and four coloured lads for the expedition; and from unpleasant reminiscences, decided on this occasion to conduct the navigation myself.

On November 7th, after stores and crew had been transhipped into the overweighted *Mabel*, and the *Albatross* had departed on her return journey to Thursday Island (distant in a right line 210 miles south-westerly), a start was made at 2 p.m. up the hitherto unexplored Bell Sound. Level-topped forests of straight-stemmed mangroves (150 feet in height) fringed the bay; and 20 miles from the coast, Bell Sound had narrowed into insignificant dimensions, its waters having intertwined *en route* with other estuaries on either side.

On the day following a descent was made seawards. Soon after heading downstream the *Mabel* became the target for the bone-tipped arrows of a few ambushed natives. With the previous night's forewarning of the imminence of the rainy season, it became advisable to recommence the survey work without loss of time. A course was accordingly steered across Deception Bay, up Port Bevan, and thence into the Douglas (Aird river-system). Above the head of the delta my

friends the Tumuanu were revisited, the precipitous cliffs of white limestone on the Philp river steamed beneath, and Victory Junction again passed.

A few miles further north the evils attendant upon burning wood fuel were first experienced, when through the failure of steam at a critical juncture, the powerful current took the launch "in charge," and swept her broadside on to a bank of pebbles in midstream. From the 12th till the 18th of November, in spite of our daily and often nightly efforts, the *Mabel* remained immovable, part of the time the whole of her hull being exposed. Such an early check after so fair a start was disheartening beyond the power of language to express. Up there among the ranges the river, still however 150 yards wide, had degenerated almost into a mountain torrent. The rise and fall in its level varied nearly every day more or less, sometimes only a foot or so, on other occasions as much as six feet in twenty-four hours, being influenced by the rainfall. Tumu natives, attracted doubtless by flotsam, visited us in canoes on 14th November, but after viewing the dismantled launch and riverside camp with manifest surprise, returned hurriedly downstream without rendering any assistance. During this delay a boat ascent was made, slightly above the highest point reached in March 1887. Traces of gold were again obtained by washing, and several photographs taken.

On the night of November 17th a heavy downpour of rain caused a freshet in the river; and in the dark and early hours of the following morning, with the aid of haulage from an improvised "Spanish windlass" erected on the banks, we achieved the emancipation of the launch, and when daylight broke, the *Mabel* was again seen floating close in under the river bank in thirty feet of water. The tree of which the barrel of the windlass was made proved to be the *Massoi aromatica*, which possesses a bark highly valued by the natives of the Dutch East Indies for its medicinal and commercial properties.

As may be readily imagined, neither the health nor the spirits of the party were improved by this enforced detention of a week's duration. It was, of course, necessary to overlook the launch the whole time. Our camp was consequently pitched on banks of black alluvium at the water's edge. During the day, at mealtimes, our right to every morsel of food was disputed by a plague of flies, while at night, sandflies and mosquitoes, swarming in myriads, drove away sleep.

Although several excursions were made into the woods, chiefly to shoot game for the pot, no view of the surrounding country could be obtained. The encircling ranges were everywhere forest-clad to their very summits with fig, eucalypus, black-walnut, cedar, acacia, sassafras, massoi, nutmeg, and oak trees, as well as with representatives of families of palms and pines, and countless other genera.

After a hasty descent of the Aird river-system, it was with no small sensation of pleasure and relief that, on Tuesday, November 22nd, the

open sea was again sighted, and the Jubilee river once more entered from Bald Head. The village of Evorra was in due course passed with no obstruction from the inhabitants; and up the second diverging arm signs of human life, not noticed in the previous April, were observed. Clusters of temporary huts had sprung up like mushrooms here and there on riverside clearings, and the flexures of the tortuous river—the water of which was now, at a distance of fifteen miles from the coast, quite fresh—afforded opportunity for a game of hide-and-seek between the *Mabel* and small bodies of natives in canoes.

Shortly after daybreak on the morning of Thursday, November 24th, while a wooding party was at work on the nearest bank, a party of natives came alongside the launch. These comprised at first thirteen males, who—so far as I could make out—came from ten different villages, of which they gave me the names. It would appear that they were representatives of a few weak bush tribes on their periodical expeditions in search of various commodities, and temporarily confederated for mutual protection against the attacks of their numerically and physically more powerful skull-hunting coast neighbours.

An album of photographs of Papuan aboriginals, which I exhibited to them, elicited open-mouthed expressions of awe and approval, together with the manifestation of a desire to break the tenth commandment. The chief of Omai, a plump and prepossessing little black man, remained on board of his own free will when the *Mabel* got under way, and watched with amusement the frantic efforts of his now numerous followers to keep pace with "the canoe that moved of itself without either wings or paddles." Three miles further on we came to the temporary village of Omai, and I took the opportunity of the chief's friendliness to secure a photograph of himself and hamlet.

On the day following, Woodhouse Junction, at the head of the delta, was reached. Ten miles further north—after expanding in one bend to a medial breadth of nearly a mile—the river finally leaves the alluvial plain, and narrows down to 300–400 yards as it winds through a belt of hills of cretaceous limestone formation, before penetrating the more precipitous recesses of loftier volcanic and primary rocks. On the gentle undulations of the foot-hills travelling on foot was easy, the undergrowth being light, and the canopy of spreading trees overhead forming an effectual shield from the full glare of the sunlight. It is there, in my opinion, that the first experiments of settlers in the way of tropical planting should be made.

Much as I should have liked to push these explorations on towards the sources of the Jubilee river, neither time, means, nor season of the year permitted. It now took almost half a day to cut sufficient wood for a few hours' steaming. The hard black and red mangrove—which burns like coal—had been left behind (on the salt-water swamps near the coast), and the launch could now scarcely hold her own against the three

to five knot currents by using as fuel the soft green timber growing near to the river banks. At any moment, through failure of steam at a critical juncture, a repetition of the catastrophe met with on the Philp river might recur, and bring even graver disaster in its wake.

A return was accordingly made to Woodhouse Junction, where shortly after emerging into the plain, the main trunk channel of the Jubilee river first bifurcates, and on Tuesday, 29th November, I commenced the descent of the previously unexplored main easterly arm, anxious to ascertain whether it entered the Gulf of Papua at Orokelo, or further to the eastward. Skirted, at a distance of a few miles, all the way by a range of limestone hills, this affluent flows in a general south-easterly direction with an average breadth of 300 yards and $1\frac{1}{2}$ to 2 knot current. A five fathom (30 feet) channel can be found (by sounding) throughout its whole course. Until within eight or nine miles of the coast, at a point near which it emerges into a delta within a delta, so to speak, the river water remains fresh.

Shortly after passing the picturesque little village of Mipoor (there are at least two villages in the neighbourhood of the same name), the Aivei breaks up into numerous great sheets of water, the most easterly of which emerges into the gulf, a mile or so to the westward of Orokelo. This affluent, some thirty miles in length, was called by natives met with at Woodhouse Junction, the Aurarmar, but natives of Mipoor and others found on the coast called it the Aivei.

These latter have little in common with the aborigines seen on the main westerly affluent of the Jubilee river, the Aveiana, as we may call them, being both stouter and taller. Some of the males would measure at least 5 feet 10 inches in height, and 40 inches round the chest. The veins and muscles of their powerful arms and shoulders show out in quite a remarkable way, as the result of constant exercise. Circular belts of stiff wood contract their waists to much less than normal dimensions. They wear the hair long and frizzy. One or two had scars on their faces like pock-marks. The majority of the males had beetling brows, coarse aquiline noses, and thick lips. A pleasing contrast to the sinister expression of many of the adults was afforded by the open, ingenuous countenances of some of the youths.

On December 1st the return journey to Bald Head via Woodhouse junction was commenced; and a previously unexplored estuary, viz. Langford Sound, was entered from Deception Bay, two days later. On the same afternoon, in a channel some 15 miles northerly from the coast, a most unwelcome rencontre occurred with a very large body of new natives.

When emerging into a wide channel, about 4 p.m., a native house was seen under a grove of coco-nut trees at the head of the reach, about a mile ahead. On turning the bend, as far as the eye could reach, the river-banks were observed to be lined with large pile-supported dwellings, the gables of many of these houses topping the ground by at least

60 feet or more. As soon as the inhabitants sighted so novel an interloper, young and old of both sexes jostled each other in their haste to reach the water's edge, and came rushing down in a state of indescribable excitement. When they had recovered from their first shock of surprise, the males—in full paint and decoration—took to canoes, and surged round their supposed prey in noisy concourse. We were obliged to proceed very slowly, for should anything happen to prevent our using the fire-arms—as would not unlikely be the case if the launch drove on to a hidden mud-bank or struck a submerged snag—it would then be merely a “toss-up” whether we became food for fishes or for cannibals.

Another source of anxiety, if one had had time to experience such a sensation, was the growing dusk, also that in half an hour at most the *Mabel's* engines would stop working for want of fuel. The river had narrowed to 300 yards. We had already steamed through a street of houses two miles long, and to which no termination was visible. We were clearly right in the midst of the largest colony of natives I have ever seen in any part of New Guinea, from the Fly river district down to the distant Louisiades—a colony several thousands strong. The crisis occurred in this wise. Some of the natives becoming emboldened by their familiarity and the influence of their numbers, at last entered our gig, separated only from the launch by a short tow-line, and commenced handing oars and rudder into their canoes. Simultaneously others massed together for a rush. As one canoeful of them scrambling on the gunwale would have capsized the launch, and the narrowing creek ahead appeared a veritable cul-de-sac—further up which it would have been madness to proceed—I at last gave the order, though reluctantly, “Full speed astern.” No sooner did the foremost natives see the little vessel moving backwards into them, and get flicked by the foam churned up by the submerged propeller, than they instantly vacated the gig, and withdrew to a respectful distance. Then the engines were reversed and the circuit completed, and the *Mabel* flew back on her own track down the watery street, safely threading a passage through an immense flotilla of canoes, manned by long lines of painted warriors, all standing up as at a review. Half an hour later, when it had become quite dark, anchor was safely dropped in a by-channel. Proceeding then in a northerly and westerly direction for two or three days, we at last, after many meanderings, emerged on a river running into the belt of the same limestone hills which crop out at the head of the delta of the Aird river-system, and to which river I gave the distinctive appellation of Centenary.

It is worthy of note that in this limestone belt above alluded to, one frequently finds in the valleys circular cavities some ten or fifteen feet in depth and fifteen or twenty yards wide. It would be an interesting study for geologists to determine whether these cavities owe their origin to earthquakes, as is the case with the “sinkholes” found in Missouri, U.S.A., and elsewhere.

By means of a southerly side-branch, Aird Hills were again reached on 6th December, and connection was thus established with the Aivei—over 100 miles distant—by a route of deep and spacious inland waterways. In stormy weather such a system of natural and navigable canals might prove invaluable as an alternative route to the open gulf.

Owing to the failing health of Mr. Hemmy and one or two of the hands, I decided to stay at Aird Hills for a couple of days to give them a rest, and in the meantime carried out some explorations on that most interesting island. The summit of one sugarloaf-shaped trachyte cone in this cluster was crusted to a depth of several feet with a deposit of post-tertiary shells, including *Melania clavus*, *Neritina gagates*, and a species of *Cyrena* contained in an earthy mould, such deposit being probably an indication of recent upheaval. From this same peak, nearly 1000 feet in height, a charming view of the surrounding country was obtained. At my feet vast silvery streams intersected the forested alluvial plain until all the waterways were merged into the adjacent sea. In the opposite or north-easterly direction, the plain terminated in line upon line of overlapping hills, beyond which again was an indefinable gap (valley, lake, or tableland), bounded on the horizon by the striated acclivities of the main range. How one longed for a balloon in which to discover those hidden inner mysteries of mountain, flood, and field!

From its position, and numerous accessories, the Aird Hills seem to me to have an assured future of commercial and strategical importance. They are, I may say, sure to become the first site of a Government dépôt at the head of the Papuan Gulf.

Starting again on Thursday, December 8th, I completed the circumnavigation of Aird Hills, and thence descended the most westerly main stream (previously named by me the Newbery) in the delta of the Aird river-system. Blending with it near Boore's Hills was a deep but rather narrow fresh-water river emerging from limestone ridges. Conspicuous upon a knoll at the very point of junction grew a beautiful araliaceous tree, somewhat resembling the Indian *Tupidanthus*, save that each leaf was over three feet in length, and there were invariably fourteen leaves in each palmate cluster. This specimen, together with many others, was lost, owing to the rough weather and treatment experienced on the homeward journey.

Twenty miles southerly, the Newbery merges into several great sheets of water, with the open sea visible beyond numerous wooded alluvial islets, also Cape Blackwood, at a distance of about fifteen miles south-easterly. Big barn-like edifices peeped up in all directions from under groves of coco-nut palms; and no sooner did the launch fairly emerge into the open than mirror-like flashes from all points of the compass denoted the speedy approach of numerous canoes. The necessity of paying attention to the voluble and acquisitive aboriginals, who soon swarmed all around us, did not by any means tend to lessen the

difficulties of navigation in these unsurveyed waters. Even under fair and favourable circumstances, the opacity of the water, irregular shape of the mud bottom, and velocity of the strong tides sweeping into this curve of the Papuan Gulf, rendered progress fraught with danger to a knife-shaped vessel drawing six feet of water. This was abundantly demonstrated when, at low water, numerous mud-shoals were bared to our view.

In order to escape from such tormentors a course had to be shaped right out to sea. This respite was short-lived, however, as both fuel and fresh water running short, it became necessary to enter the next estuary (Mitchell Sound) to the west; and anchor was dropped near to a village the name of which was afterwards ascertained from its inhabitants to be Oroï. The news of our arrival spread like wildfire through the thickly populated coast districts, and during the few days we were on and off at Oroï it became a most painful question to determine how so small a party—half of whom, owing to the exertion, exposure, and privation gone through, were little better than invalids—were without bloodshed to obtain the necessary supplies of firewood, seeing that both land and water were thronged by natives to the number of thousands in the aggregate, who were all covetous of our axes.

Our position was in other ways, too, an embarrassing one. It was now necessary at all hazards to return speedily to civilisation. On the one hand was a stretch of 300 miles or more of coast and open sea to cross in a sailless open boat that could only hold at a time, and that not safely, sufficient wood fuel for, at the outside, ten to twelve hours' slow steaming, and that too only in fine weather. On the other hand, there were the natives, and the probable chance of a continuance of the inland natural canal systems, which might conduct us into the Fly river.

Following up a new river for 20 miles in a north-westerly direction (which I named the Merewether after one of my most generous supporters), we obtained a plentiful supply of fresh water. Not meeting any diverging arm to the south or west, however, and having regard to the increasing ill-health of Mr. Hemmy and others, I decided that it would be unwise to further pursue so problematical a quest. Returning accordingly to Oroï, a day was spent in wooding, and then a start was made for the Fly river across the gulf. The Admiralty charts proved to be of little assistance on the route from George Inlet to the Fly river; and that district would likely offer an interesting field for exploration to any one wishing to engage in the work, and having a sternwheel steamer of shallow draft available for that purpose.

The harbour of Thursday Island was again entered by the *Mabel* after many further vicissitudes, on the 26th December.

Erratum in former paper.—In the hurriedly written paper entitled "Discovery of Two New Rivers in British New Guinea" (published in

'Proceedings R.G.S.,' October 1887), and also in the accompanying map, a mistake of half a degree of longitude was made through a clerical error on the part of the draughtsman who compiled the plottings. By taking measurements from the consequently inaccurate plan instead of from the original field notes, this error was inadvertently repeated in the statement of estimated positions as given in the written account.

Thus the meridian of east longitude intersecting Cape Blackwood should be $144^{\circ} 30'$, and not 144° ; and the same proportionate adjustment applies to all the other longitudes quoted in the article above referred to.

Note on the Origin and Orthography of River Names in Further India.

By SAMUEL E. PEAL.

THE confusion that was caused for many years by the various and often incorrect modes of spelling Indian names is well known to all who are, or have been, in any way connected with this country, and some years ago reached such a climax, that the Government wisely took the matter in hand, adopting the system of Sir William Jones, or so-called Hunterian mode of transliteration, and freeing us to some extent from a chaos that was rapidly becoming unbearable.

Unfortunately the erroneous spelling of many proper names had become so fixed by usage that a change for the better was practically impossible, and thus the mistakes of the past will be handed down for the mystification of posterity.

In other cases, names that were at first spelt correctly, have been thoughtlessly altered, and unless taken in hand at once will become unmeaning, and at times misleading, fixtures. The word "Assam," derived from the word *Abom*, and which latter is spelt *A S A M* by the Assamese themselves, is a case in point; formerly in all private and public correspondence and published works there was one *s* only; but in an evil hour the spirit of innovation moved some one to alter the correct mode and give us the unmeaning *ss*.*

The Germans, more careful in these matters, retain the correct form, and Kiepert even goes so far as to indicate the derivation from "*Abom*," the name of the Shan settlers, who came in A.D. 1228 and conquered the province.

The word "Naga" again, as applied to the hill tribes south of Upper Assam, is a more important instance of needless blundering, inasmuch as it bids fair to become a perpetual and fertile source of gross mistakes in relation to those races. Already we find Mr. Phil Robinson, in his "*Day at the Zoo*," and no less an authority than Dr. Hunter himself, confounding them with the Naga, or snake-worshippers of Upper India.

It is precisely in cases of this nature that the Royal Geographical Society might interfere with judgment, and save thereby endless future mistakes. These hill races really are not Nagas, and they have not the remotest relation to the so-called snake-worshippers. Among themselves, and except from our lips, the word Naga has been unknown to them, and when their languages and customs are collected and collated it seems highly probable that instead of Mongoloid, they will show strong Dyak affinities.

* We adopt, according to rule, the spelling, *Assam*, given in Hunter's '*Imperial Gazetteer of India*.'—[ED.]

Fortunately for us it is very easy to trace the course of the mistake made by us in calling these races Naga.

One of the earliest records relating to these hill races is in the old Assam Borunjia, or "History of the Kings of Assam," and the reference first met with dates back to the year 1228, when the Ahom or Shan invasion took place; other references follow, and in all cases the tribes, occasionally specified by name, are called Noga, *N**o**g**a*, and not Naga, *N**a**g**a*, thus precluding relation to Nag or snake worship; as a matter of fact also, they do not, as far as I know, worship snakes anywhere in these hills.

Again, Assamese call them always distinctly Noja, and only by Bengali Babus are they called Naga, and though the term Noga is of course, through long usage by plainmen, to them well known, it is not used by the hill races in reference to one another, for the simple reason that the original root word "nok" for folk is common.

"Tem nok ó" (what folks are you) is often heard when strange gangs meet, so that not only is there no warranty for "Naga," but we have (as above) the actual proof that it should be Noga, from Nok, an indigenous word meaning folk, possibly related, through Grimm's law, with the Sanskrit Lok, "a man," and the vernacular log, as in "hum log, tum log" (we folk, you folk). But the necessity for care and a system in rendering words and names beyond our frontier are still greater; the student, traveller, or surveyor, at times finds it impossible to collate various routes over the same tract of country, even in Government publications. The "Selection of Papers relating to the Hill Tracts between Assam and Burma," printed at the Bengal Secretariat Press, stands unrivalled in this particular. Judging by the 'Proceedings R.G.S.' for May 1885, the freaks of spelling are not yet over, for in the map by Mr. R. Gordon, the great western tributary of the Upper Irawadi is called the Malce Kha; and I would here draw attention more especially to the desirability of reform and some system in the spelling of river names about here.

"The names of rivers are probably the last to change in any age or country, being frequently retained long after the originating language is extinct, as in America, and the subject is of special interest where Aryan and non Aryan races have evidently overlapped in times past."

But perhaps the most interesting and instructive feature in connection with river names is to be found in the various terms used to express "River," or "Water," and that are often attached to the proper "name-word," and occasionally even stand in place of it.

Taking then the various terms used to express river or water, as an illustration of the need for correctly rendering local names, and the very unlooked-for results that may arise from a study of the variants, I will begin a few lists of the names for rivers east of Assam, where in some cases the name is so frequently misspelt.

In the case of the great western tributary of the Upper Irawadi, above referred to, we find it on the maps and in Journals spelt thus, so far—Malce kha, Melec kha, Milec kha, Mili kha, all of which unfortunately are wrong. The real Singphu name is Mli kha, where there is absolutely no pause or vowel between the M and L as in MLI.

No doubt at first it is not easy to render these unusual double consonants, so common among all these Eastern dialects and in East-Central Africa, but a little patience and practice will enable us to get over it.

Our only object in spelling these unwritten names *at all*, we should recollect, is to convey the *actual sound* as near as possible; and we should also remember that the words usually have local meanings attached, which would be unintelligible if not correctly rendered in speech, and by the spelling.

This is exactly what our very erratic methods make so difficult. Such words as Ndong, Ntem, Mbong, Ngrai, &c., are common in Singphu and neighbouring languages, and a little attention to the spelling would save us many very ludicrous mistakes; thus, even the careful Wilcox spells Nchong as Insoong, and Bisa la as Puseelah. But the various modes of spelling Mli kha (which is Singphu) are equalled in its Kamti name. Properly it should be Nam kiu, and we have it varied as kioo, kio, kiou, and kieu, and these latter four disguise the significant fact that kiu is the local and Kamti rendering of the Tibetan *chu* for *river*.

Geographers have, I believe, long wondered what this "kiu" was, and here we have its meaning—we have the kiu in "Nu kiu," "Ou kiu," "Nam kiu," "Nam kiu Lung," &c.—and all grouped at or near the same region between Eastern Assam and West China. Taking the next river east of the Mli kha or Nam kiu, we find it a fair sample where the name is carried through the several variations; thus, it is the Di sang, Sang kha, or Nam sang. Di, which is so common in and around Assam, stands in many hill dialects for *water*, kha of course is Singphu for *river*, and the Kamti Nam stands for *water*, and thus "Sang" is the *name-word*. But perhaps the great eastern tributary of the Upper Irawadi rejoices in the greatest number of names of any river near, and undoubtedly most of them might be suppressed with advantage, as they are simply slight variations in spelling the one name. We have the Phoong mai, Phong mai, Phung mai, Pong mai, Shoo mae, Shwey mai, Shu mai, Shu maiy, Soom meh, Sin mai, Sgin mae, Sgin mai, Zin mai. Some Burmese words are left out, and the Singphu word kha.

It is unlikely that *all* the written variations are in this list, so that here we have some twelve or thirteen names for the one river, over a distance of perhaps 150 miles or less, and as the list stands it is obvious that a reform in the direction of uniformity is most desirable. In regard to this river, it may be noted that the name of "Pang mai" occurs in the Sibesar district of Upper Assam, applied to a small stream, and the meaning of which is unknown locally.

Turning to the Salwin, we find that it also rejoices in many quite unnecessary spellings, that could be suppressed without loss or regret; we see it figuring as the Nu chu, Nu kiu, Nu kion, Nu kioo, Ngu kiu, Ngeu kiou, Nu kiang, Lu kiang, Loo kiang, Lou kiang, Lou tao kiang, Lu tse, Lu tze.

There can be little doubt that the word Lu tse is the name of the river, and not of the tribes of savages, called also "Kunungs," and by the Chinese "Anong," and it has become to some extent a synonym for those iron-workers living between the Mli kha and Salwin.

The prefix Nu is evidently the same as Lu, especially when we see the second portion of the compound, chu, kiu. Kiang and tse mean the same, i. e. *river*. It seems probable that the word Nu means black; it is the term for black in several dialects, and, if I mistake not, some of the upper branches are called Nak or "Nuk chu," and "Kara ussu," Nuk and Kara both meaning black, and chu, ussu, *water* or *river*.

Thus the curtailment of unnecessary and often misleading modes of spelling river names in this particular (or other) region might well become the work of qualified geographers and of our Society, especially at a time when it is desirable to spread as far as possible a knowledge of and liking for geography; indeed, a little reform in other names, as in the instances given of "Asam" and "Noga," would at such a time be invaluable, and save an immense amount of trouble in the near future, when new and popular maps may become common, and will otherwise be means of perpetuating errors now easily removed from geographical works. But I would also draw the attention of the Society to the extraordinary and often unlooked-for results that may attend a systematic revision of the modes of spelling words like

the Tibetan "chu," not so much perhaps to alter local variations, as the obviously needless ones; for the local variations are, as I propose to show, of great value as a means of tracing anthropological relations past and present. The class of alteration I would suggest is, to write the Nam "kiu" as above, and suppress the other forms of kio, kioo, kion, and kien, which four latter variations are not only not necessary, but are not on the Hunterian system, which "kiu" is.

Taking now the Tibetan word "chu" for river, and tracing its variations east and west, both to the north and south of the Himalaya, we find the subject a much larger one than might at first be expected, and one that involves many questions that refer to anthropology, historic and prehistoric. For instance, geographically, this one word leads us from the extreme east of China, across the whole continent of Asia, actually to the Gulf of Salonica in Europe, and from Mongolia to Siam. A preliminary list of the rivers having forms of Su, "chu," Tsi, Si, Ti, Di, Doi, Da, &c., for water, among races in Central and Southern Asia, and as found attached to rivers, will be found in the 'Journal Asiatic Soc. Bengal,' vol. xlviii. part i. 1879, but the subject is there necessarily slightly touched on, and needs careful elaboration, with assistance from many quarters, ere it will yield its full results, which should be of a very valuable and interesting nature.

In China and contiguous localities we have, on maps and in papers alone, the following variations on the three commonest variants, many of which could no doubt be profitably suppressed; but it is desirable, in considering this matter, to locate as clearly as may be where the original root-word started from.

<i>Si.</i>	<i>Sui.</i>	<i>Su.</i>	<i>Si.</i>	<i>Sui.</i>	<i>Su.</i>
<i>Shi.</i>	<i>Shui.</i>	<i>Shoo.</i>	<i>Tsze.</i>	<i>Chui.</i>	<i>Tsu.</i>
<i>Chi.</i>	<i>Shwi.</i>	<i>Chu.</i>	<i>T'sze.</i>	<i>Tchui.</i>	<i>Tchien.</i>
<i>Tsi.</i>	<i>Shwui.</i>	<i>Chew.</i>	<i>Tsze.</i>	<i>Tchui.</i>	<i>Tcheou.*</i>
<i>Tse.</i>	<i>Chooi.</i>	<i>Choo.</i>			

Possibly, or indeed probably, the root is simply "Su," and of Mongolian origin, that in spreading to south and east has been hardened to Chu or Tsu. But in any case we find, if advancing westwards from China, how very conspicuously the Himalaya range has acted as a speech-parting.

North of it we find the variations few and of the same general character; Su of Mongolia, Chu of Tibet and Bhutan, Sou of Central Asia, Sui of Persia, and Sial, Soui, Su, of Asia Minor; and, as before remarked, Su, as "Kara su," black river, in the Gulf of Salonica, into which two rivers of this name fall. We thus see a trace of this word, as attached to rivers, over nearly 100° of longitude.

Passing from say China westward, south of the Himalaya, we find the most remarkable, and in some cases systematic, series of variations. In the basin of the Upper Irawadi, as has been shown, we have a local form of chu, as "*kiu*" in Kamti, and in Siam and Burma the Chinese Tsu and Tsi, as "*si*," while in Assam and the hills around we have an endless series of Di and Ti, varied to Tsi, Dzu, Chi, Tui, Doi, Da, and, among the aborigines and hill men of Chota Nagpur, Da, Dak, Dah, for water.

But even these local variations are often needlessly obscured by our erratic spelling; thus the simple Di of Assam (water) is rendered by different surveyors as Di, De, Dee, and Dy, the three last quite unnecessary. At present the Assamese are unaware of the real meaning of this Di, so that the race or races who named these rivers are gone,† nevertheless we have distinct clues here and there as to the origin

* 'Nature,' June 11, 1885, p. 135.

† The Assamese verb *tulid* is identical with the Noga *tulid*, in both cases "wetted."

of the names; thus the Disang river in the Sibsagar district, where it enters the hills, is called 'Ti sing and 'Ti sa (two branches). 'Ti is the Noga (there) for water, and sa "the young," so that the 'Ti sa is literally the "young river."

But the word standing for water does not always stand as a prefix, it is occasionally seen at the end, as La-thi, Gulm-thi, of the Mishmis, or Ning-thi (beautiful water) of the Manipuris. We also see it elsewhere as Ai-ti, Rap-ti, Tap-ti, Kampti, in other parts of India—non Aryan words. At times it is even disguised, as in the present "Jumna," derived from Ja mund, or Di-a-mund of Ptolemy, or the river name may be bodily changed by later races, as in the "Dhunsiri," which originally was "Di ma," the Big river of the Kachari races, who built the now ruined Dima per, and it is still called 'Ti ma in the hills.

The Subansiri again was the "Om chu," but the disguises in the names are not confined to Assam. In the Indus we have the Ind su (on old maps Ind hub), and in Oxus, the well-known and pretty common Ak su or white water, the Kara su or black water being extremely common. Even in the word Euphrates, or Phratos river we find the eu is "the Assyrian hu (Greek eu), Scythian ku, water," so that our Tibetan chu and Kamti Nam kiu has carried us far afield, geographically, and also in the realms of time. Bearing in mind that the Babylonians were a so-called Turanian race, we need not wonder that the Phratos river received the eu as a prefix. Whether in the 'Ti of Tigris we may yet find a trace of the 'Ti so common to the East, and as in 'Ti sta, time may show; at present the nearest we can get is 'Ti groi. See list of river names before noted.

The prevalence of 'Ti and Di as a prefix to river names in Assam is so notorious that the wonder is the subject has not long ago attracted the attention of geographers; possibly the variations in the mode of spelling this Di has disguised it. The whole subject is well worthy the attention of anthropologists; it points to a remote past when not only the plains of Assam, but India generally, were inhabited by races, the remnants of whom now survive in the hills, and who have most curious and peculiar social customs in common. These races, since their dispersion, have become so far differentiated in language, and even physique, as to be fairly classed as distinct now. Yet among them almost all we see the (Miri) "morong," (Noga) "pah," or "drizn," where all the boys and single young men are not allowed to sleep at home, but must sleep all together, in large or small barracks, that occasionally are guard-houses. Often as many as six or eight, at times twelve or more morongs are in the one village, and in these the lads can dance and drum to their heart's content; but all are under peculiar laws, handed down from generation to generation. In many tribes the girls also have similar morongs, called in Assamese "ga bru morongs."

Seemingly these are all the relics of a state of (prehistoric) communism that extended more or less all over India, and is yet to be traced among the aboriginals of Chota Nagpur, where Mr. Driver records them as "bachelors' halls," before which the girls dance in the evenings. The custom is also seen all over the islands, and as far south as Borneo and New Guinea.*

The significance of the institution will be at once seen when we note that, among all such tribes, juvenile chastity is not valued, i.e. there is complete sexual freedom till marriage, when, as a rule with these races, *morality* begins, and is far more strict than among so-called civilised races. Actual marriage by capture is, however, rarely seen; the common people are endogamous, and the chiefs alone exogamous in most cases.

The "morongs" survive as a relic of the almost obsolete communism of the past;

* Vide Dr. Hollrung's account, 'Proceedings R.G.S.,' 1888, p. 602.

and, as far as I can see, anthropologists are unaware of the vast mines of information lying here unworked, especially all around Assam.

Returning, however, to the question of revision in the spelling of names, especially river names, the time seems ripe for action by our Society in this matter, as the study of geography has received a stimulus, and it is most desirable that the more obvious errors should be eliminated, if possible, in some authoritative manner.

GEOGRAPHICAL NOTES.

News of Mr. Stanley.—As our readers will have learnt from the public papers, the long silence of Mr. Stanley has been broken by the receipt of a letter from him, addressed to Tippo Tib, and dated the 17th of August last. The letter was despatched from Bonalya, near the scene of the murder of Major Barttelot; it stated that the writer had returned to the Aruwihimi for the remainder of his stores, after having reached Emin Pasha, and made an appeal to Tippo Tib to come and join him. This, it has been since reported, was refused, and Stanley has returned to Emin. It is believed that after a brief stay, Mr. Stanley will make for the East Coast by a route to the westward of Victoria Nyanza, picking up his reserve supplies at Msalala, south of the lake, on his way.

Kilima-njaro.—In a letter from East Africa to the *Kölnische Zeitung*, Herr Otto Ehlers claims to have "set his foot on the ice-dome" of this famous mountain. He judiciously selected for his climb the northern slope, which faces the dry Masai plains and is in consequence much freer from ice and snow than the southern side, whence all previous attempts have been made. He states that "the altitude reached was over 20,000 feet," but mentions at the same time that the exact height could not be given until his instruments had been tested by competent hands. An American naturalist, Dr. Abbott, accompanied him part of the way. Tracks of elephants, buffaloes, and antelopes were found up to and beyond 16,000 feet. A further, more detailed, report is promised. Kilima-njaro, it must be remembered, was very carefully triangulated by Baron von der Decken's companion, Dr. Kersten, whose repeated measurements, which are regarded with confidence by competent judges, give a result of 18,681 feet for the highest point of the mountain.

The Usambara Country, East Africa.—Dr. Hans Meyer, an account of whose adventures on his second attempt to reach and ascend Mount Kilima-njaro appeared in last month's 'Proceedings,' gave an interesting description of the picturesque country of Usambara at the meeting of the Berlin Geographical Society last month. He said:—The mountain district of Usambara resembles an island, rising from the interminable plains around to an average height of nearly 2000 feet. The interior of

this "island-mountain" is traversed by long wooded mountain chains and by isolated towering summits destitute of vegetation, which are separated from each other by broad valleys, with rivers winding through them. In the southern part of Usambara the valleys run across the main direction of the mountain ranges, and, in consequence, allow an easy crossing from the east to the west side of the country. In the middle and north of Usambara the watershed shifts from the centre more and more towards the east side, from which, as also from the north side, the Umba river receives numerous small tributary streams; the western side and central part of the country are practically drained by the river Luengera, the chief stream of the country, which flows down into the Rufu. The rock formation is crystalline slate, which slopes gently from east to west. The rains are, according to the prevailing winds, very unequally distributed over the country, and vegetation flourishes in proportion to the amount of rainfall. In the case of East Africa, it is an established fact that those regions which receive only the precipitations of the tropical rainy season, upon which follows the rainless dry season, have no forest, but only savannahs with clumps of trees here and there. Forests exist only in those places where there is underground water, or where there is an additional rainfall to that of the rainy season proper. In the case of Southern Usambara, the humid sea-winds from the Indian Ocean regularly carry moisture there, and, in consequence, the whole of Southern Usambara, right up to the Nielo Mountains, is covered with luxuriant tropical virgin forest. From all sides brooks rush down and form the broad river-systems of the Vugiri and Zigi. On the other side of the Nielo range—to the west—the winds lose their moisture, and we consequently find there districts with a sparse vegetation of mimosas, tamarinds, cacti, &c. Again, further to the north-west, on the borders of the mountain range, where the winds blowing daily, often with great force, from the plains, cause mountain rains, forest is again found, which forms a more or less broad belt round all the region at the foot of the mountains. Three-fourths of the country is therefore fertile in a high degree, and manifestly well suited for the cultivation of many tropical products, and especially for the cultivation of coffee. The central part only is but little fertile. The large mammals of the plains are altogether absent in Usambara. It was only in the Umba river that some hippopotami were observed. At times a lion suddenly makes his appearance and lies in wait for the large herds of cattle possessed by the natives. Hyenas, jackals, and leopards are, on the other hand, plentiful. Birds of prey are very numerous, and the succulent grass meadows of the hills swarm with many-coloured butterflies, beetles, and dipterous insects. The inhabitants, the Washamba, populate most thickly the secluded north, and most sparsely the unfertile central district; the southern part is depopulated in consequence of the constant wars between the two kings Kipanga and

Kimuere. The Washamba differ little from the other negro tribes of the coast; they wear mostly cotton cloths instead of the skin aprons customary at one time. In the ears wooden pins are worn: the women carry on the lower parts of their thighs and arms coils of brass wire weighing as much as 20 lbs. As a race mark, they have upon their foreheads a round brand, as large as a shilling, which is tattooed into the middle of the forehead upon entry on the state of puberty. The huts are round, with a high, conical-shaped, grass roof, which projects far above the wall of the hut. The interior of the hut is divided into one large and two small rooms. The settlements are surrounded with a palisade-hedge about twice the height of a man, and number generally from fifteen to twenty huts; still there are villages like Vuga and Mlalo with from 150 to 200 huts. For protection against attack, all the villages are situated on the round summits of the mountains. Buffaloes, goats, and black-skinned sheep are daily driven on to the meadows. Field-work falls to the lot of the wives. The sovereign of Usambara is Simboya, living at Masinde, but the real ruler is his son Kimuere, who resides in the large village of Vuga. The government of Usambara has been for five generations in the hands of the Simboya family, who immigrated from the south-west, from the mountainous country of Nguru. Dr. Meyer, who, after he had paid a ransom of 10,000 rupees to Bushiri, was treated very politely by the latter, had a long conversation with this leader of the rebel Arabs as to the reasons of the insurrection in East Africa. Bushiri declared that in earlier times the Arabs alone had had the trade in their hands, but now, he said, the Europeans had come and wanted to take possession of the trade and to place all kinds of difficulties in the way of the Arab traders. In order to safeguard their interests, and to preserve their very existence, which was threatened, they had resorted to arms for the purpose of driving European influence out of the field.

The Proposed Congo Railway.—The survey for the proposed railway between Vivi and Stanley Pool, along a route to the south of the river, is now completed, and the report of M. Cambier, as given in the '*Mouvement Géographique*,' adds considerably to our knowledge of the topography of the region which has been thus surveyed. While the old caravan route runs approximately parallel to the Congo, and crosses its affluents near their mouths, the proposed railway route either crosses the rivers near their sources or keeps on the divides between these river-systems. Thus the deep gullies and valleys are avoided, gentle slopes prevailing on the plateau. Considerable difficulty was encountered in climbing the high land, which falls abruptly to the river. It was found impossible to ascend it by one of the tributaries of the Congo coming from the south, as they run through inaccessible gorges. But a depression was found a short distance below Matadi, from which point the proposed route ascends the high-land. The road will cross the tributary Mpozo on a bridge, and after

having avoided the plateau of Palababa by a detour to the south, it takes an E.N.E. direction, until the river Lukunga is met. It seemed at first as if some difficulties would be encountered here, but the reconnaissances of the engineers showed that the valley of the river takes a north-easterly turn, and thus they were enabled to follow its left bank without crossing it. It is stated that no serious obstacles are encountered between the bend of the Lukunga and the Inkissi, the country consisting of hills intersected by small ravines. Between the proposed route and the Congo rises the plateau of Ngombi to an altitude of 1600 feet. This part of the country is intersected by deep valleys. The Inkissi, at the point where the route crosses it, is about 350 feet wide. East of the Inkissi the population becomes less numerous, and the country is more elevated and sandy. The heights of the hills are clad with forests, and deep ravines intersect the slopes of the plateaus. Approaching Stanley Pool, the line has to pass over hills about 300 feet above the Congo, which are traversed through narrow and tortuous valleys. Later surveys show that a better line may be found further west. In the meantime the establishment of a regular connection with the Upper Congo by means of oxen is contemplated, the Sandford Exploring Expedition and the Belgian Company being united for the purpose of establishing regular commerce with the Congo basin.

M. Trivier's Proposed Examination of the Lukuga.—M. Trivier, a French explorer, left some time ago for Brazzaville and the Congo. He intends to proceed to Nyangwé for the purpose of carefully examining the west shore of Lake Tanganyika, and exploring the upper course of the Lualaba, and other feeders of the Congo. M. Trivier does not believe that the Lukuga is the real outlet of Lake Tanganyika, and proposes, therefore, carefully to explore its course, and also to discover if there is no other outlet. M. Trivier believes that if the observations of Mr. Stanley are correct, the Lukuga would have ceased to flow long ago, seeing that the level of the lake is rapidly falling. It may be stated, however, that according to Captain Hore's observations, the bed of the Lukuga is a deep layer of mud which is being washed away, and that it will discharge the waters of the lake until the rock is reached.

A Voyage up the River Wheni (Dahomey).—This river, which forms the boundary between the kingdom of Dahomey and Porto Novo, was ascended last summer for a considerable distance by M. Foa and two other Frenchmen. M. Foa has communicated an account of his journey to the Geographical Society of Paris. The Wheni had not before been explored except for a few miles from its mouth. M. Foa and his companions ascended the stream as far as Affame ($0^{\circ} 15' E.$ long., and $8^{\circ} 9' N.$ lat.), 98 miles from the coast, and effected an exact survey of its course with the compass. At its embouchure the river is about 700 yards broad, and at the time of the rains (September and October)

the current is so strong, that navigation upstream becomes impossible. For more than 70 miles it has a nearly uniform breadth of from 250 to 300 yards. The flat sandy region of the coast being passed, the country becomes well-wooded and hilly, and the river banks increase in height from a few inches to 24 feet. The country continues to be of this character until the village of Fanvier is reached, which is situated on a hill (named by the party Mount Foa) about 300 feet above the sea-level; this was the highest elevation observed. The air there is as pure as it is unhealthy elsewhere. In the vicinity are numerous other hills with hamlets on their slopes. Above Fanvier the river flows through a grassy plain, which extends to the east and west as far as the eye can reach, without a single tree upon it. A little above Affame, the furthest point reached, the country again assumes a hilly character. The party were about to continue their voyage upstream, intending to proceed until the river was no longer navigable, and then advance by land, when they learned that the King of Dahomey had become aware of their presence in the country, and they consequently deemed it prudent to beat a hasty retreat. The right bank of the Wheni is much less populated than the left bank, owing in a large measure to the periodical attacks made on the villages along the former by the King of Dahomey. The petty chiefs of this river basin rule over two or three villages each, and, while recognising the suzerainty of the King of Porto Novo, are practically independent. Most of the villages are duplicated, so that the natives can escape across the river when attacked by the people of Dahomey. The Wheni basin supplies all the commerce of Porto Novo, and partly that of Lagos. Palm-oil, maize, cattle, and ivory abound there; indiarubber exists in great quantities, but is not collected. The expedition of M. Foa was undertaken with the sanction of M. Bayol, Lieut.-Governor of Senegal, and it appears from the traveller's narrative that the whole of the basin of the Wheni, as far as Affame, has been placed under the "protection" of France, and a post of Senegalese soldiers has been stationed on the island of Aguogue, the point at which the main stream divides into two arms before reaching the coast.

A Night on the Elbruz Saddle.—Mr. Freshfield communicates the following note:—Baron Ungern Sternberg, a German physicist at present in the Caucasus, forwards the following account of an adventure which well-nigh proved fatal to himself and his companions. The recent experiences of M. T. Vallot on Mont Blanc (*'Annuaire du Club Alpin Français,'* vol. xiv., 1888), when a party of four spent three days and nights in a tent on the actual summit, have suggested a physical explanation of the fact often observed by mountaineers, that mountain sickness, at any rate up to 20,000 feet, can, in the majority of instances, be overcome by training. The following passage gives the result of M. Vallot's experience:—

"Par quel mécanisme d'accommodation les habitants des hautes régions du globe peuvent-ils s'habituer à l'air raréfié des grandes altitudes? Là encore, mes expériences

peuvent donner la clé du mystère : trois journées d'habitation au sommet du Mont-Blanc ont suffi pour modifier entièrement le régime de ma respiration ; le dernier jour, ma capacité pulmonaire avait notablement augmenté et mesurait 250 centilitres ; le nombre des inspirations était de 17 par minute, au lieu de 14 dans la plaine ; quant à la profondeur des inspirations, elle avait doublé, étant devenue de 100 centilitres. Ainsi, l'air était deux fois moins dense que dans la plaine, mais il en entraînait deux fois plus dans ma poitrine, ce qui rétablissait l'équilibre ; aussi je ne ressentais plus aucun des symptômes du mal de montagne."

Dr. Marcet had previously written ('Alpine Journal,' 93, August 1886):—"As a person ascends beyond a certain height above the sea-level he breathes less air, reduced in volume to the freezing-point and seaside pressure, to burn a certain weight of carbon or produce a certain weight of carbonic acid, than he does at or near the sea-level."

Physicians must be left to decide between these explanations. Meantime it is a remarkable fact that no sensation of discomfort from the rarity of the air should have been recorded among a party of seven during a prolonged stay at a height about 1000 feet above Mont Blanc, and only 500 feet below the highest recorded bivouac of the Schlagintweits on Ibi Gamin.* A similar absence of any such affection was noted in the first ascent of Elbruz, whilst in the second (Mr. Grove's) most of the climbers suffered severely. In 1868 and 1888 there was a high wind, in Mr. Grove's ascent none ; and, so far as my observation goes, still fine weather appears to predispose to mountain sickness. I throw out this observation, however, only for confirmation or contradiction by the experience of others.

The following is an abbreviated translation of the Baron's graphic account:—

"On the 23rd August last I started from the camp of the Survey officer, M. Golombievsky, with him and nine Cossacks. My object was to take magnetical observations on the saddle between the two summits of Elbruz, and to examine a crater marked by M. Golombievsky on his map, of which he claimed to be the discoverer. We ascended over the Iriktehai Glacier. At 6 p.m. we reached the snow and breccia or lava crags which rise out of the névé. The night was clear, with a cold wind. The Cossacks were badly supplied with provisions, and M. Golombievsky and I shared ours with them. (Bar., 38·39°; temp., 1·4° R.). We started late on the 24th August. We crossed the névé plain ; the slope began to steepen. Ice necessitated step-cutting, and the Cossacks, who had no nails in their boots, roped themselves. M. Golombievsky and I had Steigseisen. We came to a very steep ice-slope (28°), which, after some 300 steps had been cut, led up to a snow plateau. We spent a stormy night on rocks, at a height of 14,700 feet. (Bar., 35·01°; temp., 3·75° R.). On the 25th we started about 11 a.m. Four of the Cossacks knocked-up, and all wished to return, but finally five agreed to accompany us. About five p.m. it became less stormy, and fine snow began to fall. To return by the difficult route we had come was impossible—we were all too tired. I hoped to find shelter on the north side of the mountain, as we could not be far from the crest. The storm and snow-wreaths ceased for a moment—we saw our goal before us. We were soon above. A broad expanse opened

* 'Alpine Journal,' vol. xii. p. 31.

out; we crossed this, and a 'Hurrah' in honour of the Czar echoed from the Andesite crags. We quickly crossed the summit-ridge, and began to go down. About 100 yards below the saddle we found at 6.30 p.m. miserable night quarters; under the shelter of some isolated small crags, exposed to hailstorms, snow, and hurricane. The cold was frightful; we had no tent; I and M. Golombievsky huddled up together, and both felt that our camp might well be our grave. In the night the storm only increased. I have been in a hurricane on the island of Dago, in the Baltic; I have been surprised by a snowstorm on the Aletsch Glacier in the Alps; but I had never even imagined a tempest of such violence. It was clear to me that we must wait where we were till the weather improved. Probably the storm extended low down, and should we start, the danger of losing some of our party in the numerous crevasses would be greater than that of freezing where we were tolerably sheltered. I must be pardoned for hurrying over the descent, it is too painful a subject; it was a flight, and a disorderly, reckless one. In the end, I remained in the rear with a sick exhausted Cossack. It was not I who found the descent in the storm, it was God alone who led us two unhurt through the innumerable crevasses. On the evening of the 26th, I found myself safe, but with frost-bitten feet and hands, at the Kosh (shepherd's hut) you know well in the Terskol glen. For the exact accuracy of the foregoing account I pledge you my word as a gentleman. We spent 16 hours at a height of 17,840* feet, according to M. Golombievsky's measurements."

The attempt recorded above is the first occasion on which Elbruz has been approached by a route the practicability of which I pointed out in 1869, that is, by its eastern glacier, which flows from under the eastern peak into a glen, the stream of which joins the Baksan above Urusbach. This route is shorter in distance, but doubtless longer in time, owing to the extent of snow and ice to be traversed, than that by the Terskol glen on the south-east previously adopted.

The crater mentioned in this account evidently lies on the eastern flank of the eastern peak of Elbruz. It has apparently no connection whatever with either of the two craters, described respectively by Mr. Grove and myself, which form the actual summits of the mountain. It seems, however, that this fact has not been universally recognised, and some doubts, which I conceive to be uncalled for, have been consequently cast on the survey officer's claim to its discovery, on the ground that it had been previously noted by Mr. Grove or myself. So far as I know, M. Golombievsky was its discoverer.

From the above account it is obvious that the climbers committed a grave imprudence in pushing on in spite of more than doubtful weather on a mountain at once so lofty and so exposed as Elbruz. That they survived sixteen hours' exposure to storm at such an altitude, and that their desperate descent did not end in disaster, was better fortune than could have been anticipated. It is greatly to be desired that Russians

* According to the latest official map in my hands the height of the saddle is apparently given as 17,570 feet, but the figures may possibly refer to a point below it. The two summits of Elbruz on the same map are marked as 18,170 and 18,347 feet, but until the exact points measured and the method of measuring have been fully ascertained, it will be prudent to adhere to the figures of the five-verst map.

should take a leading share in the thorough exploration of the glaciers and peaks of the Caucasus. But it is only a due return for much courtesy to warn emphatically Caucasian explorers of every nationality that, unless they approach the great mountains with a strict observance of the laws of mountaineering, frequent disasters must inevitably ensue. Elbruz, in particular, is at once a very easy and a very dangerous mountain. Only tyros in mountaineering will find any paradox in this statement, which I desire to recommend earnestly to the attention of all whom it may concern.

Baron Ungern Sternberg further inquires whether his expedition can be correctly described as an ascent of the summit (*Gipfel*) of Elbruz. The answer is clear. An ascent of a mountain is an ascent of its highest, or one of its highest, peaks. In the case, for instance, of the well-known Wetterhörner, in the Bernese Oberland, an ascent of the *Mittelhorn*, or of the *Hasli Jungfrau*, may be properly described as an ascent of the *Wetterhorn*. The case of Elbruz is an exact parallel. Again, a *Gipfel*, or summit, is a prominence, as distinguished from a *Sattel*, or depression, in a mountain crest (*Kamm*). (See Von Sonklar's 'Lehrbuch der Geographie,' part ii. p. 4.) Baron Ungern Sternberg's expedition may be most correctly described therefore as a "Besteigung des Elbruz Sattel," or Ascent of the Elbruz Saddle. In geographical literature generally, however, and particularly in Germany, the word ascent or its equivalents have been commonly used with unscientific and regrettable laxity, with the natural result that errors and confusions have arisen, and have been necessarily followed by contradictions and explanations. It was on this account that I qualified my reference to the expedition in question in the preceding volume (p. 762) by the words "according to the newspapers." Geographers will be indebted to Baron Ungern Sternberg for affording a convenient opportunity for a public statement of the principle long ago recognised and adopted by the Alpine Club.

An apt illustration of what I have written above comes conveniently to hand at the last moment. In the number of the *Globus*, a deservedly popular German geographical magazine, of January 7th last, will be found an article entitled "Besteigung des Kasbek," and signed by Herr von Seidlitz of the Statistical Department at Tiflis. It is, in fact, an account of the adventures of some Ossetians who made two plucky attempts to ascend Kasbek from one of the northern glens west of the Daniel Gorge, but were on both occasions driven back by bad weather at the foot of the final peak. Some years ago I ventured to extend or particularise a well-known epigram by asserting that "Caucasian critics are climbers who have failed."* Herr von Seidlitz is at pains to prove again how thoroughly I was justified. He adopts and enlarges on local reports in order to prove that I and my companions set up a

* 'Alpine Journal,' vol. xii. p. 338.

false claim to have climbed the peak in 1868. He grossly misquotes me to the effect that our party only took the incredibly short time of four hours in climbing the mountain; whereas I stated that we took four hours in ascending from 11,000 to 14,800 feet, and $5\frac{1}{2}$ hours in climbing the further 1800 feet to the top. An answer to all his arguments is to be found in my 'Central Caucasus,' a copy of which is in the Museum at Tiflis, or in the 'Alpine Journal,' vol. xii. pp. 320-339, in which I have dealt generically with the class of commentators to which Herr von Seidlitz apparently belongs.

Further reply would be thrown away on so unconscientious a writer. It may be serviceable, however, to any Russian or Caucasian climbers who desire to verify the advantage of the route discovered in our descent in 1868 if I repeat the following simple directions. Follow the Tchach, the chief tributary of the Devdoraki torrent, to its source, then climb the easy slopes on the (true) right of the Atchieretchi Glacier to the ridge separating it from the Devdoraki Glacier. Bivouac for the night under a rock tower above the icefall of the latter, visible from the spot whence the Devdoraki Glacier has been photographed. From this point (marked "Volgichki, 13,454 feet," on some maps), it is easy to enter the great névé plateau at the northern base of the two peaks of Kazbek, which was apparently attained from a more westerly valley by Herr von Seidlitz's Ossetian friends. From this plateau the ascent of the peak offers no greater difficulty or danger than that of Mont Blanc from the Grands Mulets. And when a hut has been constructed at the sleeping place the only hardship will be avoided. A direct ascent from the Post Station by the eastern or southern face will, however, always be a more or less difficult or dangerous expedition, according to the state of the snow on the very steep upper slopes. Doubtless before many years have passed the ascent from the north will be frequently made, and tourists of all nations will look back with mingled amusement and surprise to the lucubrations of the learned men who were unfortunate enough to find "able editors" ready to exhibit to the world how little they understood, or were able to appreciate, the details of mountain climbing, the configuration of Kasbek, or the ordinary veracity of Englishmen.—[D.W.F.]

Dr. Schweinfurth in South-western Arabia.—Dr. Schweinfurth arrived at Aden at the end of the year *en route* to Hodeida. He intends to explore the little-known Menakha Mountains in the neighbourhood of Sana. He has letters from the Sultan, and has received ample support from Berlin.

Grombchevski's Journey across the Pamir.—M. Venukoff has communicated to us the following information regarding Grombchevski's expedition, which started last spring from Turkistan with the aim of crossing the Pamir into Dardistan and the Upper Indus. The last

information (up to Dec. 2nd) about Grombchevski's movements came from the Russian Consul at Kashgar, who had received several letters from him. After having left Lake Kara-kul (in East Turkistan) the traveller reached the highlands of the Pamir from the north, and followed the course of the Ak-su up to its confluence with the Istyk. There he was stopped by the Chinese authorities coming from Tashkurgan. Grombchevski succeeded, however, by means of presents to the local *beg*, in obtaining permission to continue his journey, and crossed the water-divide between the upper Ak-su and the Vakhn-daria. But here he met with a new obstacle: when he had reached Baza-i-Gumbaz, he learned that the Afghans had sent a military detachment for the purpose of arresting him and bringing him to Sarad on the Vakhn-daria. To avoid this, he took a south-eastern direction, and went up the Aksai, a small tributary, on the left bank, of the upper Vakhn-daria, and made a stay for the night in its valley. As the night came, the expedition saw the fires of the Afghan camp, and decided to attack them themselves. It was raining, and the night was very dark, so that the Cossacks succeeded in crawling to the Afghan camp to seize the men, and to bring them disarmed to the Russian camp. Grombchevski obtained from the Afghans all necessary information, took them with his expedition, and crossed the Hindu-kush; there he set them at liberty. However, on descending the southern slope of the Hindu-kush along the streams which flow towards Nagar and Hunza, the expedition lost one-half of its horses. Grombchevski sent at once one of his men to the ruler of Nagar and Hunza to ask for help. The help came; men were sent by the ruler, and they transported the luggage of the expedition to Hunza on their own backs. The expedition stayed for some time at Hunza, and thence returned by another route. It crossed the Mustagh, and after having left some of his luggage at the sources of the Tun river (a tributary of the Yarkand river), M. Grombchevsky went to Pill, whence he soon returned and continued his journey down the course of the Tun as far as its junction with the Yarkand river. Thence he took an eastern direction down the latter; but after having met there with new obstacles, he went to Bas-robot, and thence crossed the high mountains which border the Pamir, reaching a spot situated 27 miles to the north-east of peak Tagarma (Mustagh-ata), and 47 miles to the W.S.W. of Yanghi-hissar. From this spot he sent to the Russian Consul at Kashgar the following message: "No provisions, no food more; I am in extreme danger, and request immediate relief." The expedition already being then on Russian territory, it must be presumed that the relief came timely, and that the results of M. Grombchevski's remarkable explorations will be saved for the benefit of science.

Trade in Persia.—In view of the special attention which has recently been directed to the trade of Persia, the following extracts from the Report (No. 445) for 1887-8 of Mr. W. G. Abbott, our Consul at Tabriz,

on the trade of his province, will be of interest. The Report comments upon the difficulty of obtaining accurate returns from the Custom House. The imports for 1887-8 amounted to 910,108*l.*, against 795,390*l.* for the previous year, and the exports to 575,035*l.* against 253,023*l.* Taking the trade collectively there was an increase of 436,750*l.* or nearly 42 per cent. Great Britain does about 80 per cent. of the import trade, the chief articles imported being cotton and woollen goods. Russian sugar has almost completely ousted French sugar from this market. The Russian sugar industry is, by the latest accounts, making great progress. The returns show that Russian sugar was imported to Tabriz this year to the value of 62,628*l.*, whereas the imports from Marseilles only amounted to 461*l.* With regard to the exports, by far the largest branch of the trade is in dried fruits. The trade is almost exclusively in the hands of Russian Armenians, who can send the article from the interior, via Ardebil, to the Caspian littoral for shipment to Baku, at a far cheaper rate than could be done by other merchants through Khoi and Erzeroum to the Black Sea. Cotton is exported to a considerable extent; the Russian Government have bestowed some attention upon the culture and development of cotton in this province by the gratuitous distribution of Charlestown cotton-seed amongst native land-owners. Russia is by far the largest consumer of the products of the province, whilst the fair established at Baku, on the plan of the one at Nijni Novgorod, will, according to the Consul, attract Persian goods more and more to Russian markets. England takes 12 per cent. of the export trade and stands next to Russia; France, Austria, Hungary, and Germany bring up the rear. In conclusion the Consul states that the most pressing want of the province is the construction of roads.

Survey of the Black Mountain Region.—Captain Wahab, who with an assistant accompanied the Hazara Field Force in the recent Black Mountain Expedition, reports as follows on the survey work which he accomplished:—"Up to the end of the Akazai country we have a complete survey extending a good way west of the Indus, and a certain amount of reconnaissance work in the Chagarzai country up to about Judbai. North-east of the Black Mountain we have surveyed from Nandibar (the limit of the survey in the 1868 expedition), north to the range beyond Allahi, and west to the hills overlooking the Indus. We here fixed the course of the river up to, say, 15 miles north of Thakot, and I have sketched on the $\frac{1}{4}$ -inch scale as much as possible of the country between the Indus and the Swat valleys, what I could see from the Chel Mountains and the Ghorapher Pass. I have made three stations and fixed a number of points in the lower ranges between the snowy peaks fixed by the Great Trigonometrical Survey and our frontier, which, I hope, may be useful on future occasions. While I was triangulating on the top of Chel, Imam Sharif went down the hill to Pokal with the troops, and got in most of the Allahi Valley. There is a gap in the

survey of the Indus valley from bend west of Thakot down to Jubbai, which cannot be seen without going into the Chagarzai country; but even if we do not go, I have got the course of the river practically fixed within about half a mile one way or the other."

Survey Work in Ceylon in 1887.—The Governor's Report for 1887, which has just been issued as a Parliamentary Paper (No. 37), contains some information as to the progress made during the year with survey work in this island. The Report states that the operations of the Survey Department have been of an important and varied character. Besides the ordinary work of surveying Crown land for sale, a large amount of surveying was undertaken in connection with irrigation schemes and forest reservation. The minor triangulation of the island was continued during the year and thirty new stations were established. The great triangulation of the northern part of the island, for the purpose of connecting the Ceylon system with the Madras coast series of the Great Trigonometrical Survey of India, was completed. Considerable advance was made during the year with surveys of roads, streams, and lakes in all the provinces. In all 297 miles of roads were surveyed and mapped, of which 186½ were in the North-Central Province.

British Guiana.—The Governor's Annual Report for 1887 on this colony, which has recently been published as a Parliamentary Paper (C—5249—25), contains some interesting information regarding the trade, population, and rainfall of that region. With respect to the movement of trade, we have compiled, from this and previous Reports, the following table, which shows the amount and distribution of the imports and exports for the years 1884-7. From this table it will be seen that both the imports and exports show a decrease in the years 1885-6, but a very marked recovery in the year 1887. This decrease in the exports is practically accounted for by the heavy and continued fall in the price of sugar, the staple product of the colony, and the increase shown in 1887 is due according to the Report, to the indomitable energy of the sugar planters, to whom great credit is due for zealously pursuing their industry, and making costly improvements in machinery, &c., in face of the heavy loss they have sustained through the operation of the sugar bounties in foreign countries, and, says the Report, "the abolition of those bounties is a consummation earnestly desired in the interest of this and other British sugar-producing countries." Among other facts which may be noted from a consideration of the table are the following—the rapid and regular increase in the exports to the United States, the continuous decline in both exports and imports as regards British West Indies, and the steady character of the trade with the United Kingdom and British North America. The principal heads of cultivation are canes, coco-nuts, plantains, coffee,

cocoa, and rice, and agriculture generally seems to be in a satisfactory condition. The population has increased from 264,063 at the end of 1884 to 277,088 at the end of 1887; taking the area of the colony at

IMPORTS.

	1884.	1885.	1886.	1887.
	£	£	£	£
United Kingdom.. ..	1,099,504	724,671	787,052	916,417
United States	823,888	345,342	295,864	317,021
British North America ..	112,154	90,764	101,072	94,930
British West Indies	177,517	49,813	36,866	82,577
Bermuda	2,545	171	367	413
India	193,451	195,928	143,464	169,589
Other foreign countries ..	90,889	60,248	69,162	72,228
African Possessions .. ..	..	445	2,450	..
Total £	1,999,348	1,467,382	1,436,297	1,603,175

EXPORTS.

	1884.	1885.	1886.	1887.
	£	£	£	£
United Kingdom.. ..	1,777,377	1,293,613	1,071,432	1,147,988
United States	281,626	308,377	562,616	813,773
British North America ..	36,919	19,967	33,022	42,316
British West Indies	103,910	64,437	44,084	31,905
Bermuda	3,524	2,619	3,051	4,984
India .. ..	..	1,046	308	458
Other foreign countries ..	118,676	110,034	127,483	149,687
African Possessions .. ..	..	729	589	531
Total £	2,322,032	1,800,822	1,842,585	2,190,592

109,000 square miles, the latter figure would give a population of 2·54 to the square mile. The total Indian immigrant population is 102,746; the immigrants from Calcutta in 1887 numbered 4356. Meteorological observations were taken throughout the year at the botanic gardens near Georgetown, and show the following figures for the monthly rainfall: January 20·45 inches, February 16·39, March 7·48, April 6·4, May 5·95, June 6·91, July 8·45, August 2·72, September 1·22, October 0·52, November 0·12, December 7·67. This would give a total rainfall for the year of 84·28 inches.

The National Geographical Society.—The American Geographical Society which was recently founded at Washington under this title has just issued the first part of its organ, 'The National Geographic Magazine.' The magazine is intended not only to be the organ of the Society, but as a channel of intercommunication in America for all interested in geographical investigation. In addition to holding fortnightly meetings for the transaction of the proper business of the Society, it is intended to issue under the care of the Society a physical atlas of the United States, in which already considerable progress has been made. Among the papers in the first number of the magazine are the following :—“Geographic Methods in Geologic Investigation,” by Wm. M. Davis; “Classification of Geographic Forms by Genesis,” by W. J. M'Gee; “The Great Storm of March 11 to 14, 1888,” by General Greely and Everett Hayden; “The Survey of the Coast,” by H. G. Ogden; and “The Survey and Map of Massachusetts,” by Henry Gannett. The Society has five vice-presidents, each of whom is expected to represent, to foster, and present an annual summary of the work in a particular department of geography. The departments thus represented are the Geography of the Land, Geography of the Sea, Geography of the Air, Geography of Life, and Geographical Art. The Society has 200 members.

REPORT OF THE EVENING MEETINGS, SESSION 1888-9.

Fourth Meeting, 7th January, 1889.

General R. STRACHEY, R.E., F.R.S., President, in the Chair.

PRESENTATION.—*Leonard Sutton, Esq.*

ELECTIONS.—*W. C. Alexander, Esq.*; *Arthur Cecil Stuart Barkly, Esq.*, C.M.G. (*Governor of the Island of Heligoland*); *Lieut.-Colonel Charles F. Call, R.E.*; *Captain Edward William Dun (Bengal Staff Corps)*; *Francis Johnson, Esq.*; *George Lishman, Esq.*, F.R.S.C. (Lond.); *Arthur Herbert Marshall, Esq.*; *John Murray Moore, Esq.*, M.D., M.R.C.S., &c.; *Septimus Vaughan Morgan, Esq.*; *The Earl of Scarborough*; *John Stokes, Esq.*

The paper read was :—

“Journey from Natal to Bihé and Benguela, and thence across the Central Plateau of Africa to the Sources of the Zambesi and the Congo.” By F. S. Arnot, Esq. (*Vide ante*, p. 65.)

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—December 7th, 1888: M. FERDINAND DE LUSSEPS, President of the Society, in the chair.—This was the second General Meeting of the Society for the year 1888.—The Chairman in his opening speech referred principally to the proposed International Geographical Congress, which the Society had decided to convene at Paris at the beginning of August next, in connection with the forthcoming Exhibition. He recalled the fact that three International Congresses of Geographers had been held, the first at Antwerp in 1871, the second at Paris in 1875, and the last at Venice in 1881. No congress of this character had been summoned since 1881, because no Society would take the initiative. The Central Commission felt that the great Universal Exhibition to be held at Paris in 1889 would afford a favourable opportunity for holding another International Congress.—The general secretary, M. Maunoir, then read the principal passages of his annual report upon the condition and operations of the Society, and also upon the progress of geography during the year 1888.—At the conclusion of M. Maunoir's report, M. Ch. Rabot gave an account of his recent journey along the west coast of Greenland.*—The following communication on the ascent of Mount Amarat by M. Eugene Markow, was also read. The ascent was commenced at five o'clock in the morning of the 13th August, after a night spent upon the rocks at an altitude of 13,000 feet. The traveller was accompanied by M. Popoff, the party numbering nine in all. Soon after starting, a conical-shaped rock was passed which rises on the south-east flank of the mountain, and it was apparently here that the limit of eternal snow was crossed (13,500 feet). From the base of this rock, in an opposite direction, a broad plain of "névé," with a slope of 35°, extends to the summit. At an altitude of 14,800 M. Markow found among the stones a *Coccinella septempunctata* of a very bright red colour, and at 15,500 some flowers growing on a little sandy eminence. At two p.m. the summit was reached. It presents to the eye a vast expanse of snow, divided into two by a precipice commencing from the north-east side and widening and deepening to 100 feet on the Turkish side of the mountain. The snow covering increases in depth towards the south-west. From this plateau two further summits rise to a small elevation, on one of which the traveller erected a cairn of stones, which, being visible from the base of the mountain, may serve to dissipate to some extent the superstitions of the natives, who regard the mountain as holy, and refuse to believe that any one has really ascended it. At a point a few feet below the summit, M. Markow fixed a minimum thermometer, supplied to him for the purpose by the Imperial Geographical Society of Russia. M. Jules Leclercq, the president of the Belgian Geographical Society, who intends shortly to make an ascent of the mountain, has promised to note the indications of this thermometer, so that in this way it will be possible to ascertain the minimum temperature of the year at a height of 17,000 feet.

—December 21st, 1888: Dr. HAMY in the chair.—Dr. Hamy announced the death of two well-known members of the Society, MM. Féraud and Riant. The former, he said, who was the French Minister at Morocco, had for many years rendered great services to geographical science by his researches into the ancient geography and the ethnography of the various regions which he had traversed. To him chiefly the world owed the first account of the primitive populations of Algeria

* See 'Proc. R.G.S.' Jan. 1889, p. 41.

and of certain parts of Tunis. M. Riant was known as the author of a remarkable book on the expeditions and pilgrimages of the Scandinavians to the Holy Land.—A communication was received from M. Woeikoff, foreign corresponding member of the Society, upon the salt-mines of Iletzk and the surrounding country, which he had visited in August 1887. After describing the salt bearings, which lie comparatively near the surface under a sandy clay soil from 7 to 28 feet in depth, he gave some of the results of the lake-temperatures, which he was able to take in the little lake Kupalnoe Ozero. The waters of this lake are very salt. Observations on its temperature were first made by M. Listow in the winter of 1878-9, when he observed a temperature, under the ice, of 3° Fahr., the lowest that has ever been recorded in the waters of natural basins. The highest water temperature observed by M. Woeikoff was 81° , showing a variation of 72° Fahr. between the recorded extremes, and as the temperature of the air was at the time of M. Woeikoff's visit comparatively low for that period of the year (August), he is of opinion that the difference is nearer 90° than 72° .—Letters from M. de la Martinière, who is still pursuing his archaeological researches in Morocco, were forwarded by MM. H. Duveyrier and G. Marcel, according to which the traveller had reached Fās, whence he intended to make a thorough exploration of the mountain of Zerun.—A brief note was read from M. Kaltbrunner, dealing with the question of the German and French boundaries in the region of Lake Liba, a statement having been made by Dr. A. Supan in Petermann's 'Mitteilungen' to the effect that in the region of Lake Liba the confines of the Congo Free State touched those of the German colony of the Cameroons. The correspondent points out that the country on the right bank of the Mobangi up to 4° N. lat. belongs to France, and does not form part of the Free State of the Congo, so that the Cameroons colony cannot be said to border on the latter.—M. Duchartre transmitted on behalf of M. d'Abbadie, a letter from M. Jules Borelli on his travels to the south of Antotto, in the Galla country.* He had been able to explore the country to the east of the Omo and to the north of the Wallamo, besides surveying the lofty summits of May-Gudo, Wallamo, Kullo, &c. He had penetrated about 12 miles into the unknown region of Kullo and visited the little kingdom of Zuigero, where he became involved in a tribal war and narrowly escaped with his life.—M. Georges Brousseau, writing from the river Inini (French Guiana), stated that that river, which was represented as a small creek on existing maps, was in reality an important river, with an average breadth of from 35 to 50 yards, flowing in a deep bed. It could be ascended in a canoe for more than 20 days in one or other of its principal branches.—The Chairman intimated the presence at the meeting of Viscount de Brettes, who had, after many vicissitudes, safely returned from his mission in Northern Gran Chaco. Starting from Apa, on the frontier of Paraguay and Brazil, he had succeeded in reaching Bolivian soil (lat. $21^{\circ} 53'$, long. $63^{\circ} 41'$), after having crossed the territories of five Indian tribes and marched through 186 miles of hitherto unexplored ground.—The Chairman also announced to the meeting the recent decision of the Central Commission with regard to legacies, to the effect that, from every legacy or gift of at least 200*l.* made without conditions to the Society, a sum would be deducted sufficient to found a prize, which would bear the name of the benefactor.—Captain Ancelle, aide-de-camp to General Faidherbe, made a statement with reference to Captain Binger, a report of whose death was current last year. The latter traveller was charged about two years ago to explore the country comprised within the great bend of the Niger. After some months of travelling he returned to Bamako, and then set out eastwards. Soon after this, at the commencement of last year, a rumour of his death was circulated. Captain Ancelle

* 'Proc. R.G.S.,' 1888, p. 451.

believed, from a letter received by him from the traveller in June last, that this report was spread by some of his men who deserted him, seeing that the letter is dated from Kong in March, or after his death was said to have taken place. No news had since been received from the traveller, but a relief expedition under the leadership of M. Freich-Laplène, left Assinnie, on the Guinea coast, on 9th September. It was anticipated that the latter would reach Kong about 12th October, but a despatch from him stated that, on the 2nd October, he had only got half-way on the road to Kong, having experienced many difficulties; he hoped to arrive there, however, in the course of November.—In conclusion, M. A. Krasnof gave an account of the explorations in the Tian Shan.*

Geographical Society of Berlin.—December 8th, 1888: Baron von RICHTHOFEN in the chair.—Dr. Von den Steinen read a paper on the Bororo Indians, that restless race of hunters who were at last conquered in 1886, but who up to that time were, in consequence of their numerous raids, an object of fear and terror to the province of Matto Grosso. The remnant of the tribe have been settled in two military colonies on the São Lourenço, one of which, viz. Theresa Christina, lies at a distance of six days' ride to the south-east of Cuyaba. About 300 Indians live with forty soldiers of the lowest description in a delightful state of idleness, and under these conditions both sections of the community interchange their bad qualities at the cost of a Government which proves its good intentions by granting handsome sums of money, but which can accomplish nothing under a system of continual change of provincial governors, so long as the military, acting in conjunction with the contractors, look upon the worthy enterprise as a means for their own enrichment. The Bororo are quite unfettered in their manners and customs, although they have nominally been baptised, and distinguished ladies and gentlemen of Cuyaba have acted as sponsors. The wizard doctors have a much greater influence among these people than they possess on the Xingu. They treat their patients only in the night. Under the influence of loud groans and the fumes of tobacco the sick person is stupefied, and finally, as the cause of the suffering, a small knuckle-bone, a small fruit, or what not, is represented as having been extracted from the body. The incurable patient is strangled by his own relatives at the command of the doctor, if at the appointed time death has not come to his release. The author himself saw a father strangle his child, who had been lying for a long time in agony, with a noose, while the mother held the boy on her lap. The Bororo have the very peculiar custom of packing their dead in baskets, which is evidently the first stage of burial in urns. The bodies are first of all buried, but after several weeks are exhumed and then the bones are cleansed in the most careful manner, the operation being attended with great festivities and dances; they are then daubed over with red paint and finally covered over in the most effective style possible with birds' feathers, especially with the plumes of the many-coloured arara parrot, which are pasted on them, especially on the skull. The square basket in which the skeleton, even to the last knuckle-bone, is packed, is also covered with a casing of yellow and blue feathers. If the wife dies, the collective property of the married couple is burnt. In great contrast with the noisy sports and dances which take place when the basket is being filled with the skeleton, is the ceremony of the interment of the bones themselves. After the case containing them has remained several days in the house of the relatives, it is buried quite quietly in a secret spot, the women being excluded from the ceremony. The Bororo believe in a continued existence of the soul, which they suppose passes after death into the superbly coloured arara parrot. The latter are conse-

* 'Proc. R.G.S.,' 1888, pp. 598-9.

quently never eaten, and, when tame, are never killed. The souls of the great magician priests are supposed to pass into other objects, especially into beautiful fishes, and even into meteors. There is no mention among the Bororo of a personal deity.—Dr. Hirth, of Shanghai, Deputy Manager of the Imperial Customs of China, spoke upon the commercial relations of the Chinese with the West in ancient times. In the early ages of antiquity it was chiefly the north and north-west provinces of the Chinese Empire which supplied foreign markets. The first demand for Chinese wares came overland across Central Asia. According to Pliny, besides silk, it was principally skins and iron that were received from China. Chinese iron was reckoned to be the best in the Roman markets. The poverty of sources of information as to these commercial relations is much to be lamented, nevertheless there is no doubt that the Chinese were far better acquainted with the Roman markets than *vice versa*. The chief article of commerce was silk. This fell into Parthian hands after their migration through Central Asia. It is evident from Chinese sources that in the year 98 A.D., at least, the trade route lay through Antiochia, Margiana, Hekatompylos, Ekbatana, and Ktesiphon to Hira on the Chaldean Lake. Here the goods were shipped on board a vessel which in ancient times was known as a "periplus," in order to make the journey from the Euphrates through the Persian Gulf round Arabia to the Red Sea. It appears, however, that silk as a speciality for weaving and dyeing was not conveyed to Alexandria, but to Petra or Rekem, whence it was transported overland to the Phœnician manufacturing towns, in order to be there either dyed with purple, worked with gold threads, or interwoven with other stuffs and made into the garments described by Pliny. These gauze-like tissues were, as we know from Chinese sources, partly sold back to China. Still in the time of the Emperors silk was bought with gold in Rome, a fact which is confirmed through Chinese sources also. A passage in Pliny affords us some idea of the extent of these commercial dealings. The passage states that India, China, and Arabia cost the Roman Empire annually 100 million sesterces, India alone 55 millions. In the opinion of Dr. Hirth it was not Pliny's desire to fix by means of these figures the value of the commerce with the East, but only to say that the trade of those countries cost the Empire 100 million sesterces, or, in other words, that this sum was paid away in coin to foreign countries—in short, that the balance of trade of the Empire was an unfavourable one. For the sum which would, according to Pliny, remain over for the commerce with China, is at most 20 million marks, and thus the quantity of silk, supposing this article to have really been paid for with gold, would have to be put down at a ridiculously small figure. From the lists of wares contained in the ancient Chinese texts it can be seen that a large part of the imports from the East were paid for with the products of the Roman markets. The longest of these lists contains about sixty different articles from the country of Ta-ts'in (Roman Empire); in another list there are seventeen kinds of tissues, which through insufficient description, can only be partly defined, such as fire-proof cloth (asbestos), gold embroideries, &c. As competitors of the market of Ta-ts'in there appeared, according to Chinese texts, the countries on "the East of the Sea" ("hai-tung chu-kuo") the lower lands of the Euphrates, with carpets and tapestries with cleverly interwoven patterns. Another important commercial product of Syria was glass, which was painted in ten different colours, and from which the Syrian traders derived a large profit. For although the art of preparing glass was known in China in the fifth century before Christ, perhaps through Syrian workmen, it nevertheless soon afterwards fell into oblivion, and the modern glass industry of China was for the first time introduced into the country by foreign glass-blowers in connection with the great commercial expedition of Ch'êng Ho, who in 1430 navigated a number of Chinese junks to India, Arabia, and the Red Sea. The glass

from Ta-tsin was principally glass beads. The following are also mentioned as trade products: gold, silver, copper, iron, lead, tin, orpiment, and realgar. The trade in gems and jewelry, and also in amber and coral, was very considerable. Among the drugs, storax and incense should be mentioned; of the latter the Chinese "Hsün-lu" appears to correspond with the Turkish "ghyunluk." In the year 166 A.D. the first inhabitants of the Roman empire came by the sea-route to China as ambassadors of the King An-tun (Antonius), because the Parthians (An-hsi), who wished to retain their position as the middlemen of the silk trade, had always barred the land route to envoys. The embassy brought from the boundary of Anam (Jih-nam) ivory, rhinoceros horn, and tortoise-shell as tribute. It appears to be no mere accident that in that same year the maritime commerce with China began. For in the year 165 the Parthians were defeated by Avidius Cassius in the reign of Marcus Aurelius Antoninus, and Seleucia and Ktesiphon were conquered. At the same time the most frightful pestilence which is known to history, devastated Babylonia, and thus it is only reasonable to suppose that the silk trade passing through the territory of the Parthians suffered an interruption, and that it was natural for the commercial regions of Tyre, Sidon, and Antiochia to come into direct connection with the Chinese market by the sea route. It was a stroke of wisdom that foreigners introduced themselves into China, not as Syrian merchants, but as envoys of the Roman Emperor An-tun (Antonius); nevertheless the knowledge of the Chinese as to the Roman Empire was limited to the eastern provinces of the latter. The furthest limit of that maritime commerce between the west and the east, which began in the year 166, lay, according to Chinese sources, beyond the Chinese borders in Annam. Ptolemy mentions the town of Kattigara. Dr. Hirth shows that this name stands in connection with the ancient designation of Annam, which was Kao-tê or Kotik. The termination "gara" or "ara" is a common one in many names of towns in the East, such as Cottonara, Minnagara, Canagara, although it cannot be shown to what language this termination belongs. Still, at the commencement of the third century, Tong-king was the goal of western navigation. An important change, however, must already at that time have taken place on the eastern side of the peninsula which caused Canton to be the terminating point of the voyage, even in that same century. For in a botanical work, the "Nau-fang-tshs-mu-chuang," which appeared in the year A.D. 300, it is already mentioned that jessamine ("yeh-hsi-ming") was cultivated in Canton by foreign merchants. The importation and planting of indigenous garden shrubs point to a more than occasional commercial intercourse, and it is only merchants settled in the country for a long time, from whom the importation of articles so difficult of conveyance as pot-herbs and seeds, could be expected.

January 5th, 1889: Baron von RICHTHOFEN in the chair.—Dr. Hans Meyer read a paper on his recent journey in Usambara and his captivity among the insurgent Arabs.*—Herr Eduard Glaser gave a short review of his three Arabian journeys, which led him principally to Yemen. Upon the third journey he visited Márib, the capital of the old Sabæan Empire, and brought home with him numerous manuscripts. Of special interest were the traveller's remarks upon his investigations with reference to the sand regions, first mentioned by A. v. Wrede, in the great Arabian desert of El Ahgôf, which engulf in their depths everything which sets foot upon them, and which are named Bahr es Saafy. The numerous investigations made by Glaser appear to prove that these sand regions must be relegated to the domain of fable.

* 'Proc. R.G.S.,' *ante*, pp. 39, 95.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Baedeker, Karl.—Greece. Handbook for Travellers. With a panorama of Athens, 6 maps, and 14 plans. Leipzig, Karl Baedeker. London, Dulau & Co., 1889: 8vo., pp. cxvi. and 374. Price 10s. [Presented by the Publisher.]

This is a translation from the German edition published some time ago. The manuscript forming the nucleus of the work was prepared by Dr. Lolling of Athens, whose knowledge of Greece is derived from a residence of many years in the country, and who has made several special journeys in the interest of the handbook. The account of Olympia was furnished mainly by Dr. Dörpfeld and Dr. Karl Purgold, two of the band of scholars under whom the recent excavations were carried on. Many other travellers have furnished useful hints and information, and the editor himself has visited Greece in order to supplement the work of his colleagues by such practical additions as were suggested by a long experience in the preparation of guide-books. The introductory sketch of Greek art is from the pen of Professor Reinhard Kekulé, and has been adapted for English readers with the help of Dr. Joseph T. Clarke. This English edition is creditable to Mr. Baedeker's English editor, Mr. J. F. Muirhead, under whose care it has been brought out. For the ordinary English visitor to Greece the book ought to prove quite satisfactory. The general map of Greece does not seem quite up to the Baedeker standard, but that may to some extent be accounted for by the fact that the materials for such a map hardly yet exist.

Brown, H. A.—A Winter in Albania. London, Griffith, Farran, & Co., 1888: 8vo., pp. viii. and 295, illustrations. Price 10s. 6d.

This little volume is the account of a winter spent in Albania, and is a welcome addition to the literature of this portion of Turkey in Europe. It commences with a description of the coast between Trieste and Cattaro, followed by an account of Montenegro. The author then proceeds to describe his visits to Rieka, Scutari, Kastrati, Tusi, Podgoritz, Helm, Pukah, the district of Ljuma and Prisrend. One chapter is descriptive of the Albanians, another deals with sport in North Albania. The illustrations are by Mr. C. H. Brown.

Fiennes, Celia.—Through England on a Side-saddle in the Time of William and Mary. With an Introduction by the Hon. Mrs. Griffiths. London, Field & Tuer, &c., 1888: 8vo., pp. xi. and 336. Price 12s. 6d. [Presented by the Publishers.]

This is an account of several journeys through England undertaken by Celia Fiennes in the reign of William and Mary, and is interesting as showing the manners and customs of those times. The writer's diligent and attentive observation of details concerning the various counties through which she passed, either on horseback or in her equipage, and her descriptions of the many gentlemen's seats visited by her are worthy of notice. Numerous towns are described, and a great many churches and country seats—some of which doubtless no longer exist—are minutely detailed. The portion relating to London is interesting. The volume on the whole gives a good idea of what England was 200 years back.

Florio-Sartori, Florindo.—L'Isola di Caprera e l'Eroe dei due Mondi. Prima edizione. Napoli, F. Furchheim, 1888: 8vo., pp. 98, map and illustrations.

— The Island of Caprera and the Hero of the Two Worlds. First edition. Naples, F. Furchheim, 1888: 12mo., pp. 100, map and illustrations. [Presented by the Author.]

A geographical and historical account of the island, with special reference to General Giuseppe Garibaldi's residence there.

Hawkins, Mary W. S.—Plymouth Armada Heroes: The Hawkins Family.

With original portraits, coats-of-arms, and other illustrations. Plymouth, 1888: 4to., pp. xii. and 189. Price 25s.; cheaper edition, 12s. 6d.

In this handsome volume, published for the tercentenary of the defeat of the Spanish Armada, Miss Hawkins has brought together some interesting records of her distinguished ancestors: William Hawkins the elder, his son Sir John, Sir Richard son of Sir John, William Hawkins the second, and William Hawkins the third, all famous in the naval annals of England in Elizabethan times. Perhaps the most interesting of the Hawkins family is Sir Richard, who has left the account of his voyage in 1593 through the Straits of Magellan to the South Sea, and of his fight with a Spanish squadron off the coast of Peru. The 'Observations of Sir Richard Hawkins, Knight,' was the first book published by the Hakluyt Society in 1847, and in a later edition (1879) the voyages of his relatives are included. Miss Hawkins has availed herself of these and other sources, adding particulars of her heroes and their families from State papers, local records, and traditions preserved in and around Plymouth, their native place. The portraits and other illustrations are good, and add much to the interest; and though we should have preferred a more connected narrative, still there is much that will repay the reader of this work.—[E. D. M.]

Léris, G. de—*L'Italie du Nord*. Paris, Quantin, 1889: 4to., pp. xi. and 469, illustrations. Price 25 francs.

This handsome volume, provided with many illustrations and geographical and personal indices, deserves notice as a specimen of how "illustrated books" may be removed from the category of *Biblia abiblia* to which too many volumes published at Christmas in our country belong.

The aim of the letterpress is to give a running description of the present state of the northern provinces of Italy, not only of their natural features and historical and artistic traditions, but also of their people and industries. The work is executed with the accuracy and lightness which French authors best know how to combine, and a great deal of valuable information may be collected from M. de Léris' pages about places and topics outside the view of the common tourist and his 'Guide.' We note slight omissions in the absence of any reference to the road-tunnel under the Col di Tenda, and in the absence of any reference to the important pass of the Col de l'Argentière, across which Napoleon decreed a "Route Impériale de l'Espagne en Italie."

The illustrations are of exceptional beauty. Two plates of the door of the cathedral of Genoa (p. 65), and of a balcony at Vicenza (p. 285), could hardly be surpassed in delicacy and success in the rendering of the texture of marbles. Equally good are some of the landscapes, particularly those taken in the Terra di Venezia at Asolo, once the seat of the Queen of Cyprus; and Possagno, the burial-place of Canova; and Bassano, celebrated for the covered bridge which gave a name to the family of local painters.

If there is a weak point in the process employed, it lies in the tendency to give distant hills an unpleasantly smeared aspect; and in one or two plates of the Alps, the absence of the tops of the mountains, probably under cloud when the photograph was taken, unduly softens the outlines of the landscape.

It is to be regretted, perhaps, that the title was not more strictly acted up to, and the limit of 'Italie du Nord' drawn at the Rubicon and the Apennines. Much has been left out of first-rate interest for the sake of getting in Tuscany. We need only cite among the omissions Vercelli, Bergamo, Parma, Lago d'Isèo, Susa, and Udine. There are no pictures of the Sanctuary of Varallo, or of Cadore, Titian's birthplace. Lesser omissions among the illustrations are the castles and sanctuaries of Piedmont and Lombardy, Orapa, San Michele, Pesio, Varese, Malpaga, Fenis, and others. The view of Monte Viso from Passana, one of the most sublime mountain views in Europe, deserved a record.

There is room for a supplementary volume, or, better still, for a revised limited and enlarged edition of 'Italie du Nord,' to be followed by a complete 'Italie Centrale.' In the latter the scenery of Vallombrosa, the Garfagnana,

the Carrara quarries, and Alpi Apuane should not be forgotten, and particular attention should be given to the old Etrurian towns between Perugia and Siena.—[D. W. F.]

Mahaffy (J. P.) and Rogers (J. E.)—Sketches from a Tour through Holland and Germany. London, Macmillan & Co., 1889: 8vo., pp. xv. and 271. Price 10s. 6d. [Presented by the Publishers.]

This volume will form a useful and certainly interesting supplement to the ordinary guide-book. The authors are too hard upon Baedeker and other makers of guide-books, forgetting that it is not their custom to take tourists into out-of-the-way places, but by the ordinary routes, and point out what is most likely to interest the average tourist. This volume shows how much of interest is passed over by the ordinary guide-books. In Dordrecht, Leiden, Haarlem, and in the Zuider Zee, the author takes us to places and shows us things not usually much noticed in these. In North Germany, again, such towns as Brunswick, Helmstadt, Hildesheim, Marburg, Fulda, and the Baltic and old Hanse towns are out of the beaten track, but are shown to be full of interest and to present specimens of German life and architecture much less changed than are to be found in places more frequently visited. A leading feature of the book is the numerous beautiful illustrations.

Umlauf, [Prof. Dr.] Friedrich.—Die Alpen. Handbuch der gesammten Alpenkunde. Wien, Pest, Leipzig, A. Hartleben, 1887: 8vo., pp. viii. and 488, maps and illustrations. Price 9s. in paper covers, 11s. in cloth.

— The Alps. Translated by Louisa Brough. London, Kegan Paul & Co., 1889: 8vo., pp. xii. and 523, maps and illustrations. Price 17. 5s. [Presented by the Publishers.]

This volume is an abridgment of the work on the Alps published two years ago in Germany by Dr. Umlauf. To allow for the larger type required by English readers the work has been abbreviated by the omission or curtailment of most of the historical summaries of the course and present position of the controversies connected with the physical features of the Alps and their formation, of numerous statistical tables, and of all the very valuable literary references in the footnotes of the original work. It has been further lightened by the suppression of three interesting maps illustrating altitudes, river-basins, and means of communication, and by the substitution for an admirable physical map of the whole chain, constructed expressly to illustrate the division into groups adopted by Dr. Umlauf in the text, of a very unsuitable and much smaller map, made, as it would appear, for no special purpose. In this not only are physical features subordinate and the divisions mentioned in the text ignored, but we find such anachronisms as the retention of Mont Iséran and the omission of the Grand Paradis. No attempt has been made to bring carriage-roads up to date. Thus the Little St. Bernard and Engadine are shown without roads. The railways now completed to Aosta, Sondrio, and Briançon have not been inserted, while a line not even in construction is indicated under the Col di Tenda. A great deal of delicate engraving is thrown away from the absence of any sufficient principle, purpose, or discrimination in the general construction.

It is unfortunately impossible to speak with any approval of the manner in which the no doubt difficult task set to the translator has been carried out. There are many gross mistakes in figures and minor details: for instance, the Mer de Glace is made "25 miles long," the Rhone Glacier "over 20 miles," the Forno Glacier in the Orteler District "15½ miles and nearly 15 broad," the Lake of Brienz "nearly 90 miles long"! Tunnels are compared not as to their length but their largeness! Thermometer readings are given without the — sign. When we come to the substance of the work we find Miss Brough perpetrating sentences which will either bewilder or amuse the reader, according to his previous knowledge of the subject and his capacity and patience for puzzling out obscurities caused as a rule, though not quite always, by a faulty rendering of the German text. "Polybius," we read, "understood the Apu-

nines to extend from near Massalia to the valley of the Rhone. Two years [two hundred?] later, however, &c." The Fohn is not correctly referred to as "a lakewind," nor is the following a true account of the "Schreckhorns": "These are, in consequence of their great steepness, entirely devoid of snow, and can only be ascended by crawling on 'all fours.'" "The glacial detrital rocks are recognised by their confused irregular strata." "The Lake of Lugano actually consists of six different compartments." "It is hardly necessary to say, there are no great rivers within the Alp district, since they represent only the lower course of the large streams, while only the upper course of the main rivers belongs to the Alpine district." Similar and even more remarkable figures, statements, and conundrums form a frequent and lively interruption to the solemn course of Dr. Umlauf's instructive and (with exceptions we need not insist on here) generally accurate chapters on alpine topography and physiography.

It may be pointed out that the view of the Pala di S. Martino is an unrecognisable caricature, and that a cut of the head of Val di Genova is misnamed "the Presanella." The illustrations are as a whole vigorous and fairly accurate, though, as might be expected, the Austrian Alps get more than the share of notice they would be entitled to from an impartial hand.

The reproduction of this work has either been attended with great carelessness or shows a very strange estimate of the critical powers and requirements of English students and readers. Its cost is 25s., that of the original work 11 marks.—[D. W. F.]

ASIA.

Bonvalot, Gabriel.—Du Caucase aux Indes à travers le Pamir. With 250 drawings and sketches by A. Pépin, and a map. Paris, 1889, pp. 458. Price 20 francs.

— Through the Heart of Asia over the Pamir to India. Translated from the French by C. B. Pitman. 2 vols.; vol. i., pp. xxli. and 281; vol. ii., pp. x. and 249. Price 11. 14s.

In this book M. Bonvalot tells the story of his journey across Central Asia and into India by the Pamir highlands. Accompanied by MM. Capus and Pépin he travelled via Constantinople, Trebizond, Poti, Tiflis, Baku, then overland along the south-west shore of the Caspian through Lenkoman to Resht. From Kasvin he posted to Teheran, not in the old fashion, riding emaciated, half-starved *chuppar* steeds, but in a comfortable carriage with three horses harnessed abreast in the Russian style. From the capital of Persia the travellers drove to Meshed in a light covered waggon, two Russian Tartars having undertaken to convey them in 28 days to that holy and exceedingly dirty city. Our author remarks on the sense of security there is now in northern Khorassan, where formerly you could not pass along the roads without imminent risk of being captured by Turkoman robbers. At Nazirabad they fell in with the American bicyclist Mr. Stevens, who had been turned back from Afghanistan; and, like him, they were obliged to renounce their scheme of entering that country by way of Ghurian and Herat. Instead they turned northwards to Sarakhs, and on arriving there communicated with General Komarof at Askabad, who furnished them with letters to Russians at Merv. They reached this place after a ride across the desert, and our author was much struck with the life and animation prevailing here, while all around is the desolate wilderness. From Merv they marched across the waterless steppe to Charjui, and crossing the Oxus continued their journey to Samarkand. None could better appreciate the advantages of the railroad which now takes the traveller over these burning sands and salt deserts. At Samarkand ends the first section of their travels. Here among old friends and acquaintances they rested a while and matured their plans for reaching India.

Their second attempt to reach Afghanistan likewise failed. They were detained soon after crossing the Oxus and turned back. Their dreams of reaching India by an overland route were not bright, as they found themselves once more at Samarkand. But Russian friends again came to the rescue, and by their advice they determined to attempt the journey over the Pamir in

winter. Proceeding to Marghilan in Ferghanah they collected full information as to routes, of which they had the choice of three: 1, by the Terek-dawan pass to Kashgar and Yarkand, then via the Karakorum to Ladakh; 2, by the Tengkiz Bai pass to the south-east of Marghilan; and 3, by the Taldik and Kizil-art passes to the Pamir, and then via Wakhan, to Chitral, Ghilgit, and Kashmir. They finally decided upon the last of these, and accordingly proceeded to Osh, where they completed preparations, hired guides, and engaged labourers to clear the snow away from the passes. On the 6th March they started from Osh with a caravan of native ponies to carry them and their baggage. At Guldja they bade a final adieu to Russian hospitality, and at Ak-Basoga commenced the ascent of the Taldik pass (about 12,000 feet). In spite of a heavy snowstorm the passage was safely accomplished, and on the 17th March they camped on the south side of the pass. Their difficulties, however, were by no means at an end. They had to toil painfully through deep snow across the valley of the Alai and the defile leading to it, fearful lest at any moment the avalanches poised on the rocks above should overwhelm them. After parting with the friendly Kirghiz who had assisted them thus far on their journey, they were reduced to a party of eight, entirely dependent on their own resources to carry them through the difficulties they had yet to face. They persevered, however, and having crossed the Trans-Alai range by the Kizil-art Pass, they descended to the ice-bound lake of Kara-kul, then to Rang-kul and the sources of the Aksu, the parent stream of the Oxus. A lively description is given of the adventures that befell them on the Pamir and of the behaviour of their men; one in particular, by name Sadik, formerly a noted baranta or robber chief, is the hero of many an anecdote. At the Chinese outposts near Rang-kul they seemed to forget their European courtesy, and assuming veritable Asiatic despotism defied the Celestial authorities, made prisoners of them, and threatened to shoot any who attempted to escape. Fortune, however, smiled on the enterprising Frenchmen; friendly natives came to their rescue when their needs were sorest, and by dint of bullying and persuasion they accomplished their object.

There is but little geography or physical science in this book, but the mere record of such a journey is a valuable contribution to our knowledge of Central Asia. We now know that the Pamirs are not the unapproachable and uninhabited region we had supposed them. We learn something of the natives and their habits, and are able to form an idea of the climate. The translation is fair, but has been too hastily done. Difficult passages are occasionally omitted and words incorrectly translated, thus *Koumganes*, a Jagatai word for a water-vessel, is freely rendered "coffee-pot" or "tea-pot," as the case may be; M. Bonvalot, however, calls it *cafetière*; *chardonneret*, a goldfinch, is given as "chaffinch"; *lagopède*, a kind of ptarmigan, is not translated at all. But the chief fault we have to find with the English version is the very incorrect transliteration of the proper names where the French spelling is reproduced, causing much confusion in the terminology. Thus the French *c* answering to our *s* is allowed to stand in such words as *Tach* = Tash and all names compounded of it, but many instances of this kind occur and deprive the book of much of its value. Other defects are due to want of geographical knowledge and careless editing, such as "Arabo-Caspian" instead of Aralo-Caspian (possibly a printer's error), *Tchitab* and *Tchilab* referring to the same river. Some of the illustrations are good, while others are poor; a little more attention, too, might have been bestowed on the map.—[E. D. M.]

Gondatti, N. L.—*Sledy Yazychestva u inorodtsev Sévero-zapadnoi Sibiri.* Traces of heathen beliefs among the natives of North-western Siberia. Moscow, 1888: pp. 91.

M. Gondatti went to Siberia to study anthropological types and make collections. The regions he visited comprised Tobolsk, Beriozof, and Obdorsk, at the mouth of the Obi. He afterwards travelled in the country watered by the left affluents of the Obi, the northern Sosva and Sygva, and the right tributary the Kazym. He also made an expedition in the northern Ural and the tundra, or moss togs in various places. The chief interest attaching to

these localities is that they are believed to be the earliest seat of the Ugrian race, from whom are descended the Fins, Hungarians, and other allied nationalities. This may be seen on comparing old maps of Russia of the 16th century, by Seb. Munster, Herberstein, and Ant. Jenkinson, where *Iugria* is marked on the right littoral of the Obi, near its discharge into the Arctic Sea. Indeed, the Ugrian people are mentioned by the Russian annalist Nestor in 1096 A.D. as tributary to the Novgorodians, and their country as situate in semi-darkness near the Samoyedes. Their former seats are now occupied by three nationalities—the Samoyedes, Ostiaks, and Manzi—besides a sprinkling of Russians and Ziriani. It is to the study of the religious beliefs of the Manzi, the present descendants of the Ugrians, that the author directs our attention in this work. The Manzi worship three gods. Their chief divinity, *Kors torum*, the godhead and father of the others, has never been seen, and is known only through the mediation of the other persons of their trinity who have frequent intercourse with earth. His eldest son, *Numi torum*, is represented in the likeness of man, splendidly attired. Once a month he descends to earth, mounted on a white steed, and takes notice of men's actions. He has seven sons, all of whom have a special locality assigned for their habitation and a particular function in the affairs of men. Their mother, wife of Numi, is greatly revered as goddess of childbirth and the destinies of men. People come from far and near to worship her image, and she may be identified with the *Shuts babu* so frequently referred to by the old travellers and figured on their maps. Besides these divinities, *boqutyra*, or warrior heroes, enter largely into the cult of the Manzi. They were formerly servants of the gods, and dwelt in heaven; but when they became too numerous they were sent down to earth, and here they behaved so badly that Numi caused a deluge, in which they were all drowned.

[India.]—Selections from the Letters, Despatches, and other State Papers preserved in the Bombay Secretariat. Home Series, vols. i. and ii. Edited by George W. Forrest, B.A. Bombay, printed at the Government Central Press, 1887: 4to., pp. (vol. i.) ii., lviii., 450, vi.; (vol. ii.) 450, iv. [Presented by the Bombay Government.]

Izvestia Vostochno-Sibirskago Otdyela Imperatorskago Geograficheskago Obshchestva. Bulletin of the East Siberian Branch of the Russian Geographical Society, vol. xix. N. 4. Irkutsk, 1888.

This fascicule contains a very interesting paper by E. W. Stelling on the amount of water which flows in the bed of the Angara river at Irkutsk. It appears from careful measurements of the section of the river, of the variations of its level, and the velocities of the current at different depths, which were made during sixteen months (September 1886 to December 1887), that the yearly amount of water flowing in the Angara reaches 71,893 cubic kilometres (17,254 cubic miles). The monthly amounts vary considerably, reaching a maximum of 8418 cubic kilometres (2020 cubic miles) in September 1886, and a minimum of 4629 cubic kilometres (1111 cubic miles) in April 1887. The lowest daily amount was on March 19th, 1887, when only 0.1373 cubic kilometre flowed during the twenty-four hours (56,110 cubic feet per second); while the maximum was reached on September 4th, 1886, when the amount of water flowing in the twenty-four hours was more than twice the above, that is, 0.2822 cubic kilometre (117,800 cubic feet in the second). The width of the Angara at Irkutsk is about 1900 feet. It reaches its highest level in January, immediately before freezing, and its lowest level in April and May, and again in December—the difference between the highest level and the lowest reaching about 12 feet. These changes are the more remarkable as the Angara issues from Lake Baikal only 40 miles above Irkutsk, and the Irkut river brings to it only one-twentieth part of the amount of water which flows through its channel. The same fascicule contains, besides the proceedings, two notes: one on the yet unknown course of the Yenisei between the Chinese frontier and the Minusinsk plains, and another on some caves on the banks of the Selenga.—[K.]

Satow, Ernest Mason.—The Jesuit Mission Press in Japan, 1591 to 1610. Privately printed, 1888, 4to., pp. vi. and 54, plates. [Presented by E. M. Satow, Esq.]

AFRICA.

Bompiani, Sofia.—Italian Explorers in Africa. 'Leisure Hour,' 1888. [Presented by the Publishers.]

In a series of five articles Miss Bompiani gives a welcome sketch of the work done by recent African explorers in North Africa mainly. Few English readers know much about the work which has been accomplished by such men as Gessi, Miani, Piaggini, and others. Miss Bompiani tells the story in a satisfactory manner, and she might do well to gather her articles into a little book, expanding them somewhat, and introducing maps.

Edwardes (Charles).—Rides and Studies in the Canary Islands. London, Fisher Unwin, 1888: 8vo., pp. xx. and 365. Price 10s. 6d. [Presented by the Publishers.]

This volume contains the results of the author's own observations during a visit to the Canary Islands, and includes an ascent of the Peak of Teneriffe. The author has also read much in these islands, so that his book gives a fair idea, in short space, of what they are like, and what the ordinary visitor may expect to experience. It contains useful information as to route to the Canaries and accommodation in the islands.

James, F. L.—The Unknown Horn of Africa. With additions by J. Godfrey Thrupp, M.B.C.S. London, G. Phillips & Son, 1888: 8vo., pp. xiv. and 344. Price 21s. [Presented by the Author.]

Mr. James's account of his interesting explorations in Somali Land will be found in the 'Proceedings,' vol. vii. p. 625. The present volume contains that narrative in much more detail, with some of the scientific results. There are numerous illustrations, including some very fine coloured illustrations of the animals. It will be remembered that the journey was made in 1885, and that Mr. James and his friends succeeded without much difficulty in penetrating southwards to the Webbe Shebeyli river, whence they found a wonderfully fertile stretch, in marked contrast to the somewhat desert character of the country through which they had passed. Though the main object of the travellers was sport, they succeeded in adding considerably to our knowledge of the geography of the region through which they passed, and of its inhabitants.

Theal, George McCall.—History of South Africa [1691–1795]. With two Charts. London, Swan, Sonnenschein, & Co., 1888: 8vo., pp. xvii. and 419. Price 15s. [Presented by the Publishers.]

The first volume of this work, embracing the period 1486–1691, was noticed in the 'Proceedings' for 1888, at p. 396. In the present volume a continuous account of events in South African history down to the year 1795 is given.

The information has been chiefly drawn from the official records of the Dutch East India Company's administration, as also from other original and hitherto unused sources, thus making the work a valuable one of its kind. The author enters somewhat fully into subjects of a statistical nature, such as the public revenue and expenditure, the record of good and bad seasons, the prices of produce at various times, the quantity of grain exported, the number of foreign as compared with Dutch ships that called, &c., &c. He also devotes a chapter to a description of the native races of South Africa. A list of the printed books consulted is given in the form of an appendix. There is a full index.

AMERICA.

Sievers, [Dr.] W.—Venezuela. Mit einer Karte der Venezolanischen Cordillere, bearbeitet und gezeichnet auf Basis der Sievers'schen Forschungen von L. Friederichsen. Hamburg, L. Friederichsen & Co., 1888: pp. viii. and 359, map.

The title of this new work by Dr. Sievers is rather misleading. It is merely the old story of his travels through the Sierra Nevada of Mérida, published in

1885, and again a few months back.* With the exception of the Venezuelan Cordillera, now pretty well known, it gives very little new about the country of any value. A couple of chapters are devoted to "Hints to Travellers," and another to "Food," which more than any other show superficial observation and inexperience. Dr. Sievers apparently does not know that rum is the fermented juice of the sugar-cane; and his definition of a "cocktail"—a sailor's drink—with other similar eccentricities, prove a great lack of observation. Altogether, as a description of the Cordillera of Mérida, Trujillo, Tocuyo, Barquisimeto, &c., the book contains some valuable information, but as a general book on Venezuela, it is disappointing, and at the most can give but a very erroneous opinion of that country. In a short chapter towards the end, the only one devoted to Venezuela generally, we are told that one-third of the total tonnage entering the Republic is German, that is 524 German steamers in one year, whereas the regular transatlantic steamers touching at the principal ports—La Guaira and Puerto Cabello—are, monthly:—English, 5 to 6; American, 6; French, 4; German, 4; Spanish, 2; Dutch, 2. The work is accompanied by a map, an exact counterpart of the geological chart published in the preceding volume, with the eleven cross-country sections replaced by two quite unnecessary enlargements of the Mérida (Guzman) and Táchira districts, and mountains substituted for the coloured geological formation.—[F. A. A. S.]

Taylor, C. E.—Leaflets from the Danish West Indies. London, printed by W. Dawson & Sons, and published by the Author at St. Thomas, Danish West Indies, 1888: 8vo., pp. xv. and 228. [Presented by the Author.]

These "Leaflets" are descriptive of the social, political, and commercial condition of the Danish West Indies. The first eighteen chapters deal with the island of St. Thomas in its historical, commercial, social, political, and medical aspects; while St. John is treated of in Chapters XIX. and XX., the remaining chapters being devoted to an account of St. Croix. The volume is illustrated with wood engravings. There is also a portrait of the author, and a biographical sketch written by Ph. Linet.

Tyrrrell, J. B.—A Brief Narrative of the Journeys of David Thompson in North-western America. Toronto, 1888: 8vo., pp. 28. [Presented by the Author.]

This is a copy of a paper read before the Canadian Institute on March 3rd, 1888. It gives a brief sketch of the journeys of Mr. David Thompson in the North-west Territories between the years 1790 and 1812, taken from his field note-books and journals. Appended is a list of forts and trading posts, the positions of which are given by David Thompson in his field note-books.

[United States.]—Commercial Relations of the United States with Foreign Countries during the years 1885 and 1886. In two volumes. Vol. i. [Europe, North America, Central America, West India.] Vol. ii. [South America, Asia, Africa, Australasia, Appendix.] Washington, Government Printing Office, 1887: 8vo., pp. vii. and 2018, chart, plans, and illustrations.

AUSTRALASIA.

McKerrow, James.—Report of the Survey Department, New Zealand, for the year 1887-88. Wellington, G. Didsbury, 1888: folio, pp. 32, map and plan.

OCEANIA.

Finsch, [Dr.] Otto.—Samoafahrten. Reisen in Kaiser Wilhelms-Land und Englisch Neu-Guinea in den Jahren 1884-1885 an Bord des Deutscher Dampfers "Samoa." Leipzig, Hirt und Sohn, 1888: 8vo., pp. 390. Price 14s. 6d.

— Ethnologischer Atlas. Typen aus der Steinzeit Neu-Guineas, in 154

* See 'Proceedings,' 1888, p. 604.

Abbildungen auf 14 Lithog. Tafeln, nach Originalen gezeichnet von O. und E. Finsch, Mit erklärenden Text. Same publishers. Price 16s. (*Dulau*).

Dr. Finsch's new work does not deal with Samoa, as its title might lead one to expect, but with his recent visit to New Guinea and some neighbouring islands in the German vessel *Samoa*. Dr. Finsch left Sydney in September 1884 for Mioko, in the Duke of York group, the special mission with which he was entrusted by the German Government being to explore the unknown or little-known coasts of New Britain, as well as the north coast of New Guinea as far as the 141st meridian, for the purpose of discovering harbours, opening up friendly relations with the natives, and exploring the country as far as possible. In the course of nine months Dr. Finsch undertook six journeys to New Guinea, steamed along the greater part of the north and south coasts of New Britain, and visited New Ireland four times. Of the 4000 miles of coast visited by the *Samoa*, only about 1000 miles were fairly well known. Seven harbours and a navigable river were also surveyed. Extensive areas of fruitful country, suitable for agriculture, cattle-rearing, and settlement, were found, and everywhere friendly relations were established with the natives. This is a brief statement of what Dr. Finsch accomplished in the *Samoa*; the detailed accounts are given in this volume, which is a welcome addition to our knowledge of the places with which it deals. Dr. Finsch gives special attention to the ethnology of New Guinea and the other islands visited, and the book abounds with sketches of the natives and their surroundings, as also with illustrations of the scenery.

The text of the accompanying Ethnological Atlas is in German, English, and French. The illustrations deal with houses, utensils, canoes, implements, weapons, ornaments, and dress.

GENERAL.

Abercromby, [Hon.] Ralph.—*Seas and Skies in Many Latitudes.* London, Edward Stanford, 1888: 8vo., pp. xvi. and 467. Price 18s. [Presented by the Publisher.]

Mr. Abercromby has been pretty well all over the world. The first chapter deals with Canada, and refers to twenty-four years ago. The other chapters, however, refer to journeys of comparatively recent date in Egypt, Australia, New Caledonia, Fiji and other Pacific Islands, New Zealand, Norway, Archangel, South Africa, Mauritius, Ceylon, the Himalayas, the Malay Islands, the United States. Mr. Abercromby is first of all a meteorologist and an experienced scientific observer; and while he deals largely with the weather and the form of clouds observed in different regions, points of geographical interest are treated at length, and the book as a whole is much above the average book of travel in scientific value.

Lucas, C. P.—*A Historical Geography of the British Colonies.* Oxford, Clarendon Press: vol. i. 8vo., pp. [iv.] and 101. Price 6s. [Presented by the Delegates.]

The introductory volume to the series was noticed in the 'Proceedings,' vol. ix. p. 652. The present volume deals with the European dependencies (including Cyprus, which is not in Europe), the minor Asiatic dependencies (Aden, Perim, Socotra, Ceylon and the Maldives, Straits Settlements, Labuan, North Borneo, and Hong Kong), and the British dependencies in the Indian Ocean. Of each dependency Mr. Lucas gives a clear and well-ordered account, dealing with its history, geography, social, political, and industrial condition, a well-selected list of books being appended in each case. There are 11 maps, small, but clearly printed and really useful.

Mill, [Dr.] H. R.—*Elementary Commercial Geography. A Sketch of the Commodities and the Countries of the World.* Cambridge, University Press, 1888: 8vo., pp. [ii.] and 132. Price 1s. [Presented by the Publishers.]

Dr. Mill's book is a great improvement on the ordinary manuals of Commercial Geography prevalent in this country, and is therefore to be preferred to these. Dr. Mill has, no doubt, been much hampered for want of space, and

this has occasionally led to incomplete statements. The book is so good that it is worth making better, and it may therefore be useful to point out a few shortcomings. Dr. Mill defines Commercial Geography as the description of the earth's surface, with special reference to the production, transport, &c., of articles of trade. He thinks Commercial Geography may be viewed in three main aspects:—(1) Applied physiography, or the description of commodities as they exist naturally, their distribution over the world, the various natural conditions that facilitate their transport, the mechanical contrivances that apply natural agents to their manufacture and improvement. This department, Dr. Mill states, gives an inventory of the world and its contents viewed as a vast workshop at rest, and without workmen, but containing the raw materials, machinery, and power all ready for use. (2) Political Economy, which describes the rules that the toilers in the great world-workshop must accept if the various divisions are to work harmoniously and to the best result. (3) Geography, or the description of the world in its relation to man, the natural divisions and artificial boundaries of countries, the distribution of population, towns with their special industries, and the laws, manners, and customs of the people. This department, according to Dr. Mill, pictures the actual condition of the world-workshop, showing what stores of raw material are being utilised, the amount of work done in each part, and the way in which the different workmen act, either following, neglecting, or transgressing the rules of the establishment. Thus it will be seen Dr. Mill's programme is wide and somewhat complicated, and it is not surprising that he has been unable to follow it out completely in what is only a primer, while, as we have said, there is much in it that is really useful and will prove suggestive in the hands of a well-informed and competent teacher. The notes which follow may be of service to Dr. Mill in preparing a new edition. It seems to us there is too little geography and too much of political economy and statistics. Too little is said of the earth's surface in the book, or of agricultural production, and nothing of latent productivity, while there is a great deal about coinage, weights and measures, differences of local time from Greenwich time, forms of government, and other subjects which can hardly be considered geographical. The book is too much a summary of import and export returns, the geographical relations of which are not shown. It is no doubt correct to say that cloves, pepper, and nutmegs come from Singapore, but it should also have been pointed out that they do not grow there, but hundreds of miles away. Moreover, we want to know why they grow where they do, and if there are not other places where they could be grown equally well?

Wheat is not almost the only food-grain produced in the Punjab, Central Provinces, and North-west Provinces. "Government irrigation works in South Australia" do not "fertilise thousands of square miles of otherwise barren land," acres would be nearer the mark. Canals do not form 4000 out of the 18,000 miles of waterways in European Russia.

"Arabia is" not "independent of the Turkish Empire." Again, while the Hejaz is noticed as part of "Asiatic Turkey," Yemen is not; and Arabia is defined as a coffee-growing country, which it is not if Yemen is excluded as dependant. It is not correct to say that dates, coffee, and gum arabic are cultivated on oases dotted over a region of sand deserts. Coffee grows on the mountain slopes (of Yemen) facing the sea, not in oases.

Half a page is given to Persia without any reference to its climate, irrigation, deserts, or mountains. The only statement about Afghanistan is that it is traversed by caravan traffic between Persia and India. If there is any such through trade at all from India to Persia it is very minute. The country itself and its own trade are not spoken of.

Tibet, Eastern Turkistan, Zungaria, Mongolia, Manchuria, and Korea are classed together as semi-independent provinces: Korea being a kingdom vaguely protected but quite separate; Manchuria, a province just like any other south of the Great Wall; Eastern Turkistan and Zungaria, conquered countries despotically ruled and defenceless; and Mongolia, a "military frontier." It is not "in the south, especially about the Canton river," that opium grows.

The Nile is not the only river in Africa navigable for any distance from the sea (the Niger-Binue is navigable as far or further). Tripoli is not one of the

Barbary States, and the country intervening between Timbuctu and Morocco certainly does not yield ivory. Nor is ivory exported from Equador: what is there referred to is "vegetable ivory," as Dr. Mill of course knows, though the pupils, and even the teachers who use the book, may not.

The chain of the Andes hardly presents a long, gradual slope towards the Atlantic; and the rainless deserts on the west of the Andes are not due to the trade winds *blowing over* the Andes and losing all moisture as they do so. These winds probably do not blow over the Andes at all, the drought at the west foot of the chain is due to a want of indraught.—[J. T. W.]

[Rogers, Captain Woodes.]—Life aboard a British Privateer in the Time of Queen Anne. Being the Journal of Captain Woodes Rogers, Master Mariner. With notes and illustrations by Robert C. Leslie. London, Chapman and Hall, 1889: small 4to., pp. [viii.] and 143. Price 9s. [Presented by the Publishers.]

This consists of an epitome, largely consisting of extracts, of Captain Woodes Rogers' narrative of his voyage to the Pacific in the early years of the 18th century. It is a good specimen of the literature to which it belongs, and Mr. Leslie has done his work judiciously. The book would be an excellent one to put into the hands of young people. There are several appropriate illustrations, including a Map of the World of the period to which the narrative belongs.

Stevens, Thomas.—Around the World on a Bicycle. [Vol. ii.] London, Sampson Low & Co., 1888: 8vo., pp. xiv. and 447, illustrations. Price 16s. [Presented by the Publishers.]

The previous volume, describing the first portion of the journey from San Francisco to Teheran, was noticed in the 'Proceedings' for 1887, at p. 525. The present volume describes the remainder of the journey from Teheran to Yokohama. Starting from the former place, the author followed the pilgrim road to Meshed; he then crossed Khorassan in a southerly direction, and turning east entered Afghanistan, which was traversed as far as Furrah. He was here forbidden to go further in this direction, and under an escort was conducted north to Herat and thence back to Persia. By a circuitous route India was reached and the bicycle tour resumed at Lahore by way of Amritsar, Umballa, Delhi, Agra, Cawnpore, Allahabad, and Benares to Calcutta. The journey through Eastern China from Canton to Shanghai was next accomplished, thence through Japan, the author finally reaching Yokohama.

The volume is fully illustrated, but contains neither map nor index.

[The 'Challenger' Voyage.]—Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873-76, etc., etc. Zoology—vol. xxix. (2 vols. of text and vol. of plates.) London, Eyre & Spottiswoode, 1888: 4to., pp. xxiv. and 1737. Price 4l. 10s. [Presented by the Lords Commissioners of Her Majesty's Treasury.]

Zapiski Voienno-topographicheskago otdiela glavnago shtaba. Memoirs of the Military Topographical Department of the Staff Corps. Part 41, with maps. Rast xli., St. Petersburg, 1886. [Presented by M. Venukoff, Hon. Corr. Member.]

This volume contains reports on the geodetic, astronomical, and topographical work done in Russia by members of the corps of military topographers from 1883 to 1885, together with a summary of cartographical work in the same period, each year being treated separately. The fields of survey include all parts of Russia from the shores of the Baltic to the Pacific Ocean. On the west we find a network of triangles has been extended to the borders of Poland; on the south to Asiatic Turkey and Persia; on the south-east as far as Osh in Ferganah at the foot of the Alai range; and in the north-east to Yakutsk and the shores of the Amur. Besides this the astronomical positions of great centres have been fixed by telegraph, e.g. Riga, Kovel, Kishinef, Samarkand, Bokhara, Katti-Kurghan, &c., and a large number of photographs have been taken.

Among the newest and most interesting data are the latitudes and longitudes fixed in Western China by M. Skassi, the topographer who accompanied M. Potanin on his journey in 1884 and 1885; the catalogue of trigonometrical positions fixed in Turkistan illustrated by a diagram; a notice of Captain Putiata's journey in 1882 in the Kizil Kum and Kara Kum sands; a plan of Samarkand and its vicinity, including the archaeological researches at Afrasiab by Professor Vesselofsky; and Captain Rodionof's surveys in Darwaz and Karateghin. Of special astronomical value is the notice of the work done with the refractor telescope at the Observatory of Tashkend, although this hardly belongs to the domain of geodesy.—[E. D. M.]

The following works have also been added to the Library :—

Andree, Karl.—*Geographie des Welthandels. Mit geschichtlichen Erläuterungen.* Erster Band; Zweiter Band, Die Aussereuropäischen Erdtheile; Dritter Band, Europa, Erste Hälfte; Dritter Band, Europa, Zweite Hälfte. Stuttgart, Julius Maier, 1872 (ii.), 1877: 8vo., pp. (vol. i.) xx. and 716, (vol. ii.) xx. and 975, (vol. iii. 1) 1265, (vol. iii. 2) vi. and 772, portrait.

D'Estrey, [Dr. Cte.] Meyners.—*La Papouasie ou Nouvelle-Guinée Occidentale.* Paris, Challamel Aîné; Rotterdam, J.-H. Kramers et Fils, 1881: sm. folio, pp. 182, map and illustrations.

Hare, Augustus J. C.—*Days near Rome.* 3rd edition. 2 vols. London, Smith, Elder, & Co., 1884: cr. 8vo., pp. (vol. i.) ix. and 338, (vol. ii.) vii. and 368, illustrations. Price 18s.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

WORLD.

Alten Welt.—*Kartenskizze der —, und Zeit-Tafel von 1500 v. Chr. bis 1492 n. Chr. (Alterthum und Mittelalter).* Wien, 1888. In Commission bei Artaria & Co. Price 8s. (*Dulau.*)

This map, which has been constructed by an officer in the Austrian Army for the use of historical students, exhibits the sites of all the principal battles from 1500 B.C. to 1492 A.D. It is orographically coloured, and has the routes followed by Alexander the Great laid down in blue, while those of Julius Caesar, and other Roman commanders, are shown by red. A most valuable and instructive table is given, containing information on many subjects of interest to the student of history, which could only be obtained elsewhere at the expense of a large amount of labour.

EUROPE.

Deutschen Reiches.—*Karte des —.* Scale 1:100,000 or 1·3 geographical miles to an inch. Herausgegeben von der Kartogr. Abteilung der Königl. Preuss. Landes-Aufnahme 1888. Sheets:—63, Stralsund. 88, Grimmen. 425, Oels. 489, Hildburghausen. Price 1s. 6d. each sheet. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of December 1888.

1-inch—General Maps:—

SCOTLAND: 79 (hill-shaded); 1s. 9d.

6-inch—County Maps:—

ENGLAND AND WALES: **Cardiganshire:** 27 N.E., S.E.; 1s. each. **Carmarthenshire:** 29 N.E., S.W., S.E., 30 N.W., 44 N.W.; 1s. each. **Carnarvonshire:** 4 S.W., 8 S.W., 11 N.E.,

S.E., 12 S.E., 13 N.W., 16 N.W., N.E. S.W., 23 N.E., 34 S.E., 45 S.E.; 1s. each. **Cornwall:** 26 S.E., 43 N.W., S.W., 51 N.W., 52 S.E., 53 N.E., S.W.; 1s. each. **Devonshire:** 5 N.E., 25 N.W., S.W., 32 N.E., S.W., S.E., 43 S.E., 44 N.W., 46 S.W., 47 N.W., 57 N.W., S.W., 59 S.E., 68 S.E.; 1s. each. **Gloucestershire:** 77 S.E.; 1s. **Herefordshire:** 53 N.W.; 1s. **Lincolnshire:** 45 S.W., 56 N.W., 58 S.W., 80 N.E., 84 N.W., 88 S.E., 89 S.E., 98 N.W., 106 N.E.; 1s. each. **Merionethshire:** 4 N.W., 10 S.E., 11 S.W.; 1s. each. **Pembrokeshire:** 2 N.W., S.W., S.E. (24 S.E. and 5 N.E. on one sheet), 5 S.E., 6 S.W., 10 N.W., 8 E., 16 N.E., 17 N.E., S.E., 35 S.E.; 1s. each. **Radnorshire:** 3 S.W., 9 S.W., 10 N.E., 11 N.W., 17 N.W.; 1s. each. **Shropshire:** 76 N.W.; 1s. **Somersetshire:** 22 S.E., 45 N.W., N.E., S.W.; 1s. each. **Staffordshire:** 3 N.W., 6 N.E., S.W.; 1s. each.

25-Inch—Parish Maps:—

ENGLAND AND WALES: **Anglesey:** XII. 11, 16, 3s. each. **Brecknockshire:** VII. 8, X. 2, 4, XV. 3, 6, 8, XXII. 1, 3s. each; XXII. 4, 4s.; XXII. 5, XI. 3, 3s. each. **Cambridgeshire:** VII. 4, XIX. 3, 4s. each; XX. 2, 6s.; XLVII. 2, 14s. **Cardiganshire:** III. 11, VI. 16, X. 15, XV. 12, XXII. 1, XXXIV. 9, 10, 11, 15, 16, XXXV. 1, XXXVI. 13, 14, XLI. 9, 14, 3s. each. **Car-marthenshire:** 1, 15, 16, LI. 15, III. 13, 14, VII. 14, 3s. each; VIII. 8, 4s.; XV. 2, 7, 10, 12, 15, XXIV. 6, XXXIX. 9, 12, XI. 6, XLVI. 3, 4, 7, 8, 3s. each. **Devonshire:** LXXVIII. 6, 12, LXXXIX. 4, 6, 9, 10, 11, 14, XCI. 1, 3, 4, 3s. each; 2, 15, 3s. each; V. 16, 3s.; VI. 13, 6s. 6d.; XXX. 2, 5, 8, 9, 13, 3s. each; XXX. 15, 4s.; XXXI. 4, XXXII. 2, 15, 3s. each; XXXV. 3, 4s.; XXXIX. 1, 2, 3, 5, 6, 7, 9, 10, 11, 12, XLII. 11, 13, XLVII. 2, 3, 7, 8, 3s. each. **Herefordshire:** XVII. 2, 8, 13, XXIII. 4, 3s. each; XL. 11, 4s.; XLVIII. 10, 3s. **Huntingdonshire:** X. 3, 8, 11, 4s. each; XI. 2, 6s.; XIII. 7, 9, 10, 12, 14, 15, 16, 3s. each; XIV. 2, 4s.; XIV. 5, 7, 8, 9, 10, 11, 13, 3s. each; XIV. 15, 4s.; XIV. 16, 3s.; XV. 6, 4s.; XV. 14, XVIII. 11, 3s. each. **Leicester-shire:** XXXV. 14, 4s.; XLII. 3, 3s. **Lincolnshire:** XXII. 5, 3s.; XXII. 6, 4s.; XXII. 9, 10, XXXI. 1, 2, 8, 9, 3s. each; XXXI. 10, 4s.; XXXI. 12, 3s.; XXXI. 13, 4s.; XL. 2, 4, 3s. each; XL. 5, 6, 4s. each; XL. 7, 9, 11, 13, 15, 3s. each; XL. 16, 4s.; XLVII. 3, 4, 7, 11, 12, 15, 16, LV. 7, 8, LXXXI. 4, LXXXIX. 1, 2, 4, 6, 10, 13, 3s. each; LXXXIX. 14, XC. 10, 4s. each; CIV. 13, CXXIV. 3, 6, 9, 10, 11, 3s. each; CXXIV. 12, 4s. each; CXXIV. 13, 14, 15, 3s. each; CXXVI. 1, 2, 3, 4, 4s. each; CXXVI. 5, 6s.; CXXVI. 6, 7, 4s. each; CXXVI. 9, 10, 5s. each; CXXVI. 13, CXXVII. 3, 3, 4s. each; CXXVII. 4, 6, CXXVIII. 6, 3s. each; CXXVIII. 15, 16, 4s. each; CXXVIII. 11, 15, CXXIX. 5, CXXXII. 1, 6, 14, CXXXIII. 11, 3s. each; CXXXIII. 15, 16, 4s. each; CXXXVI. 4, 3s. **Merionethshire:** XIV. 10, 11, 12, 13, 14, 15, 3s. each; XV. 15, 4s.; XXI. 4, 6, 8, 10, 11, 12, 15, XII. 1, 3s. each; XIII. 3, 6s.; XXII. 4, XXIII. 1, XXVIII. 1, 11, XXIX. 6, 9, 10, 14, XLV. 12, 3s. each; XLVI. 9, 6s.; XLVI. 10, XLVII. 4, 3s. each. **Norfolk:** LV. 4, 4s. **Northamptonshire:** VIII. 11, 6s. **Pembrokeshire:** XLIV. 4, 3s. **Radnorshire:** XXV. 2, 5, 15, XXXIII. 3, 4, 7, 11, 15, XXXVI. 3, 10, 15, 3s. each; XXXVIII. 4, 4s. **Somersetshire:** XLVII. 4, 4s.; XLVII. 5, 14, 3s. each; L. 8, 5s.; L. 9, 13, 3s. each; L. 16, 4s.; LX. 2, LX. 6, 7, 8, 12, 3s. each; LXI. 3, 4s.; LXI. 8, 16, 5s. each; LXIX. 10, 16, 3s. each; LXXI. 10, 13, 4s. each; LXXVII. 8, 3s.; LXXVIII. 11, 15, LXXXIX. 4, 3s. each; LXXXIX. 8, 4s.; LXXXIX. 9, 10, 3s. each. **Warwickshire:** X. 6, 3s.; XXXIII. 8, XXXIII. 8, 4s. each.

Town Plans.—10-foot scale:—

ENGLAND AND WALES: **Birmingham,** XIII. 8, 4, 6, 19; 2s. 6d. each. **Boston,** CIX. 9, 8; 2s. 6d. **Coventry,** XXI. 8, 24; XXI. 11, 6, 9, 10, 13, 14, 18, 19, 20, 24, 25; XXI. 12, 1, 7, 8, 9, 12, 22, 23; XXI. 15, 6; 2s. 6d. each. **Great Grimsby,** XXII. 3, 20; XXII. 4, 16; XXII. 7, 18, 23; XXII. 8, 1, 12; XXII. 11, 10; 2s. 6d. each. **Holyhead,** V. 14, 24, 25; V. 15, 21; XI. 3, 1.

(Stanford, Agent.)

AFRICA.

Kongo.—Karte des mittleren —. Auf Grundlage der Original-Skizzen der oesterr. Kongo-Expedition, aufgenommen von Dr. Oscar Baumann, mit Benutzung der vorhandenen Quellen entworfen und gezeichnet von Paul Langhans. Scale 1:400,000 or 5.5 geographical miles to an inch. With six inset plans on the scale of 1:200,000 or 2.7 geographical miles to an inch. Mitteilungen der k. k. geogr. Gesellschaft in Wien, 1888, Taf. viii.

AMERICA.

British Honduras.—Map of —, by Alfred Usher.

When we noticed this map in the 'Proceedings,' December 1888, we were not aware that the map which reached our hands was an uncorrected proof; this, however, was the case, and the error to which we then called attention does not appear in the corrected and published copies.

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in November and December 1888.

No.		Inches.	
1154	m =	5.0	Scotland, Hebrides:—Lochs Erisort, Luirboat, and Grimashadar, 2s. 6d.
126	m =	6.0	North Sea:—Heligoland, 2s.
974	m =	15.0	Mediterranean, Malta:—Valetta harbours, 2s. 6d.

No.		Inches.	
1184	m =	1·7	Mediterranean, Africa:—Bay and lake of Tunis, 1s. 6d.
238	{ m =	3·0 }	Africa, east coast:—Kilifi river and approaches.
	{ m =	6·0 }	Kilifi river (Preliminary chart), 2s.
1169	m =	0·98	China, Tong King gulf:—Approaches to Port Courbet and interior channels. Nui Kak Ba and Pak Ha Mun, 2s. 6d.
1180	m	0·67	China, south-east coast:—Approaches to Hong Kong, 2s. 6d.
1211	m =	0·14	Australia, east coast:—Rame head to port Jackson, 2s. 6d.
318	River St. Lawrence:—Plan added, Beaujeu channel, West narrows.		
512	Venezuela:—Plan added, Estanques bay.		
1301	South America, west coast:—Plan added, Gatico cove.		
746	India, west coast:—Plan added, Mangalore or Kodyal Bandar.		
912	Anchorage in islands off N.W. part of New Guinea:—Plans added, Powati anchorage. Payahe road. Batian road. Weda road. Mata road. Gane road. Gimia road. Gam Sungi road. Esples island anchorage. Laet bay. Kassem road.		

(J. D. Potter, Agent.)

CHARTS CANCELLED.

No.		Cancelled by	No.
126	Heligoland	New Plan. Heligoland	126
1184	Bay of Tunis	New Plan. Bay and lake of Tunis	1184
238	Kilifi river	New Plan. Kilifi river and approaches	238
2259	Plan of Ceniza, mouth of Rio Magdalena, on this chart.		
1734	Sirangon harbour and Johore channel.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 1179. England, west coast:—Bristol channel. 109. England, east coast:—Entrance to the river Humber. 2307. Norway, west coast:—Smölen island to Sve fiord. 2308. Norway, west coast:—Brand fiord to Leko. 1520. Mediterranean, Greece:—The Peiræus. 2806. North America, east coast:—Charleston harbour. 2259. West Indies:—Savanilla harbour and Rio Magdalena. 2530. North America, west coast:—San Diego bay to cape Mendocino. 1862. Africa, west coast:—Jaboo to river Forçados. 1174. Africa, west coast:—Bonny, New Calabar, and Sombreiro rivers. 1877. Africa, west coast:—River Gaboon. 664. Africa, east coast:—From 6° 38' S. to 4° 23' S. 1811. Africa, east coast:—Chala point to Kwyhu bay. 2741. South Indian ocean:—Mayotta island. 928. Eastern archipelago, Sulu archipelago. 999. Siam:—Menam Chau Fya or Bangkok. 1019. China, south coast of Hainan island:—Yu-lin-kan bay, Gaalong bay, &c. 348. Australia, east coast:—Whitsunday isles to Magnetic island. 174. South Pacific ocean:—Banks group.

(J. D. Potter, Agent.)

United States Charts.—No. 1113, Port Nelson, Rum Cay, Bahamas. Price 1s. 1d.—No. 1115, Blanca and Falsa Bays, West Coast of Lower California. Price 1s. 6d.—Pilot Chart of the North Atlantic Ocean, January 1889. Published at the Hydrographic Office, Navy Department, U.S.A. G. L. Dyer, Lieut. U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Berghaus' Physikalischer Atlas (begründet 1836 von Heinrich Berghaus), 75 Karten in sieben Abteilungen, enthaltend mehrere hundert Darstellungen über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und unter Mitwirkung von Dr. Oscar Drude, Dr. Georg Gerland, Dr. Julius Hann, Dr. G. Hartlaub, Dr. W. Marshall, Dr. Georg Neumayer, und Dr. Karl v. Zittel. Herausgegeben von Prof. Dr. Hermann Berghaus. Siebzehnte Lieferung. Containing sheets Nos. 12, 41, and 68. Gotha, Justus Perthes, 1888. Price 3s. (*Dulau*.)

Sheet No. 12 is a geological map of Africa, on which plans, on enlarged scales, of nine different districts are given in the form of insets. Sheet No. 41 is a map of the world on Mercator's projection, on which are shown the lines of equal magnetic inclination. Sheet No. 68 is an ethnographical map of Asia.

Johnston, W. & A. K.—The Mulum in Parvo Atlas of the World. W. & A. K. Johnston, Edinburgh and London, 1889. Price 2s. 6d.

This pocket atlas is convenient in form, and contains a large amount of statistical information in addition to the maps. It is likely to prove useful as a work for general reference, but where detailed information is required other larger works must of course be consulted.

The introduction of physical maps is a creditable feature, though on so small a scale they can hardly be completely satisfactory. The supply of maps of South America and the English Colonies is exceptionally good; those of the two islands of New Zealand are, however, crowded and somewhat confused. In the statistics of Switzerland the list of passes is at once defective and arbitrary, and the Mont Cenis Tunnel has no connection with the Republic.

PHOTOGRAPHS.

Alps.—Enlarged Photographs of the High Alps, taken by the late Mr. W. F. Donkin. Size 15½ by 23½ inches. London, Spooner. Price 12s. 6d. each.

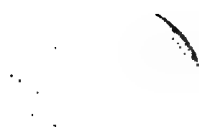
These views have been selected from the numerous collection of Alpine views taken by the late Mr. W. F. Donkin, as illustrating the physical phenomena of the High Alps and of glaciers in general. In them the ice-stream may be followed from its snow reservoirs to its termination. The dirt-bands and curved waves on the surface of the ice are singularly conspicuous in a view of the Mer de Glace taken from the top of the Aiguille Dru. This series of photographs afford ample material for the scientific illustration of works on physical geography, by which plates would be true to nature, and, therefore, really serviceable to the student, as well as beautiful in themselves.—[D. W. F.]

Kabyle Mountains, Algeria.—Photographs of the Scenery and People. Size 7½ by 9½ inches. London, Spooner. Price 1s. 6d. each.

These photographs illustrate the remarkable landscapes, buildings, and people of the Kabyle Mountains in the neighbourhood of Fort National and between Algiers and Bougie.—[D. W. F.]



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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

The Gran Chaco and its Rivers.

By Captain JOHN PAGE, Argentine Navy.

(Read at the Evening Meeting, January 28th, 1889.)

THE Gran Chaco derives its name, according to Charlevoix, from those great Indian battues, or collections of wild game, which, surrounded by a cordon of fire and hunters, were gradually driven to a given centre. It is a vast central tract of country lying between the southern tropic and 29° S. lat., bounded on the north by Brazil and Bolivia, on the south by the Argentine province of Santa Fé, on the east by the Paraná and Paraguay rivers, and on the west by Santiago del Estero and Salta. It contains about 180,000 square miles, or considerably more than the superficies of Great Britain and Ireland. About one-third part of this vast area belongs to Paraguay, but the exact demarcation of limits between the Argentina, Bolivia, and Paraguay has still to be made, although between the first and the last of these countries an arrangement was entered into, through the arbitration of President Hayes of the United States, which must necessarily be called satisfactory. I should, however, still consider it an open question as regards the upper sections of the Pilcomayo, and its settlement will, I believe, be one of the important outcomings of the work of explorers, in which I should like to include my own, although in doing so I may explain that my work has only supplemented the great efforts of others, but has happened at a time when a great movement has been directed to the Gran Chaco as an immense new field for enterprise. The Gran Chaco has been called, particularly in allusion to the low-lying Paraguay section, the "Océano firme," or solid ocean. In fact, owing to the comparatively limited means of communication, it was formerly considered too vast for an undivided control, and the Argentine part was constituted into two territorial governorships—one called the Chaco Austral, contained between the Argentine provinces of Santa Fé, Santiago, and Salta, and the rivers Paraná, Paraguay, and Bermejo; the other the Chaco Central. A third section is that belonging to Paraguay, part of which, along its

northern side, is disputed by Bolivia, and according to the eminent Bolivian minister now at Buenos Ayres (Sr. Vaca Guzman), goes by the name of Province of Azero. This section and that of the central^a rise from the Paraguay river towards Bolivia almost imperceptibly, having numerous and very extensive marshes and jungle, which are drained by many small streams likely to become, as the country progresses, important local waterways. The monotonous level of these sections is relieved by various prominent points of great beauty along the Paraguay river. Both are well wooded, although the predominating woodland feature is the great and almost interminable palm forests, which, singularly enough, in the Chaco are a sure indication of marshy lands subject to inundation, although in the province of Entre Rios, and other parts of the world, they are the exact contrary. On the northern and eastern borders of the river Bermejo the Central Chaco rises sensibly, as if to form a barrier to the waters of that river in their easterly progress.

The Chaco Austral is the most favoured in natural riches of these three great sections. Its surface rises gradually from the Paraná river, and is intersected by several small streams, which are even now useful as a means of water carriage to the many colonists settled along their courses; after rising thus up to the parallel of 25° 40' S., the ground dips towards the valley of the San Francisco, sending its waters with those of that river to the Bermejo, sometimes in untimely floods. This depression extends across the Central into the Paraguayan Chaco, taking in the sections of the two rivers that are subject to yearly overflows between long. 61° and 62° west of Greenwich, thus making a point of analogy between the two.

The Austral is favoured with extensive primeval forests, notably that on the north-western border extending into Salta and covering a superficies of many hundreds of miles, quite unexplored, and sometimes designated by the name of "impenetrable"—not that I should say these forests were destined to enjoy that immunity for any long period now.

The principal watercourses of these territories are the Pilcomayo and Bermejo, which are undoubtedly destined to become highways of commerce. The waters of these rivers differ in colour, those of the Pilcomayo being dark and sometimes brownish, and those of the Bermejo red, as its name indicates; both are long, narrow, and tortuous, as are most of the interior rivers of the La Plata system, both run in a general south-east direction, preserving a remarkable parallelism throughout their entire course, running distant from each other as nearly as possible 180 miles. Their depths and general characteristics correspond, and their obstructions, which are extremely numerous, being confined to narrow argillaceous beds, quite removable, and fallen trees of that hard indestructible wood which is a speciality of those forests, and which are

^a Formerly called Yapizaga, or Llanos de Manzo.

dragged into the river-beds by the waters in flood-time eating into the banks beneath, where they tower majestically. I have often seen, with pain, these beautiful trees fall into the river with a fearful crash, like veritable giants, and have determined, should the opportunity be afforded me, to help in keeping those unruly rivers within bounds. Neither of these streams receives tributaries of any kind over the greater part of their course, and their waters are consequently subjected to a great and constant drain from evaporation, in a climate whose average temperature is 80° Fahrenheit, as well as from absorption by the deep alluvial covering overlying the compact argillaceous bed, which is a geological characteristic of the whole Chaco subsoil. The impermeability of this bed probably arrests the effect of absorption, and in a great measure accounts for the non-diminution of the wealth of waters delivered into the Paraguay; such a geological formation may also account for the saline properties of the waters found in the Chaco, wherever wells have been made, although I am not prepared to say of what nature the salt is which impregnates them. The waters of the Pilcomayo and Bermejo are drinkable, but hard and unsuited for washing, a chemical condition which varies in intensity in proportion to their dependency upon their springs alone.

The density of the Bermejo water is, however, greater than that of the Pilcomayo; the amount of sediment it brings down is enormous, and it is deposited with such extraordinary rapidity that it cannot but be considered a peculiarly strong feature of the mechanical work of this river, by which its geological formations are rapidly made, and, indeed, unmade as well; this swift precipitation of its detritus, which it replaces by an increasing abrasion of the banks, may be caused, to some extent, by the quantity of salt contained in its water. I may state that this constant precipitation goes on in the Bermejo, even when at its height, and when in the exercise of its greatest carrying power, with a speed quite equal to the square of its normal current; a fact which would seem to say that its currents are swifter on the surface than over its bed. I have seen this river eat away an entire point of land, and, by way of compensation, deposit, just a turning below, an amount of detritus sufficient to form a similar promontory, which in one season of low water became covered with a thick and luxuriant growth of red willow, a fact which I looked upon as one of nature's provisions against a further removal at least for a time, as the adhesion of the roots of those plants would naturally offer considerable resistance.

The Pilcomayo.—This great river, the Piscumayu as it is called in the Quichua tongue, signifying Bird river, is to a great extent unknown, despite the many attempts to explore it, and it has never been *ascended* to any very great distance, although one military party came down from Bolivia more or less along its banks.

The section that is quite unknown, and that is surrounded by a

certain mythical halo which it will be a geographical triumph to dispel, is that comprised between long. 61° and 62° W., and the parallels of 22° and 23° S.; the river at this point was said, by theorists who forgot to account for its reappearance immediately below, to disappear altogether; this apparently magical disappearance seems to have taken place with some rivers. The Upper Paraguay, as I have witnessed, has been known to flow, as if absolutely lost for many miles, beneath a matted covering of living and dead vegetation, several feet in depth. In the year 1858, one of these growths, under the influence of an extraordinary inundation, broke loose, and drifted 2000 miles down to Buenos Ayres, where it brought up with many wild animals and reptiles on it, that had taken refuge there from the almost universal deluge. The Pilcomayo is not affected in this way, and I believe that this river not only does not become lost, but that there will be found no insuperable obstacles to a navigation over the section I have just alluded to.

The Pilcomayo has its main sources in a moor lying between the historical plains of Vilcapugio, where General Belgrano suffered a severe reverse in the long and valiant struggle for Argentine independence, and Tolapalca; it runs in a general south-easterly direction, coursing between Sucre, the capital of Bolivia, and the city of Potosi, whence it descends a rather rapid incline to lat. 21° S. and long. $62^{\circ} 25'$ W., receiving on the way the contributions of many smaller streams and of one very important one, the Pilaya or Suipacha, which winds between the hills of the world-renowned silver-mines of Potosi; it empties into the Paraguay by two mouths, one six miles below Asuncion, and the other, with which I am not familiar, in front of the pass of Angostura, where the Paraguay's left banks slope back to the beautiful heights which became celebrated from the valiant defence made by the Paraguayans against overwhelming odds of the Brazilian forces, and where the principal fort on the river was commanded and gallantly defended by an English gentleman, Colonel Thompson.

Just below the Pilaya the Pilcomayo debouches almost suddenly from the highlands of Bolivia into the low lands of the province of Caiza, the town of that name being the capital of the Bolivian Chaco (as its province is sometimes called), whence it flows down an incline of about one foot in the mile on to the Paraguay. On the parallel of 22° S., at the exact point where theorists gave it up as a lost river, it begins that erratic wandering which has been the confusion of more than one explorer, and threw out entirely the imaginative Van Nivel, whose accounts with their exaggerations have been quoted by De Moussy as facts; after running a few miles to the south-east, it suddenly turns due north, but leaving several minor branches by way of blinds looking in the opposite direction. One of these is erroneously called by explorers the Aguaray, signifying Rio del Zorro, or Fox river, but according to the distinguished historian and present Argentine Minister to

Great Britain, Sr. Louis Dominguez, its true name is Araaquai; it has been considered by some the principal river, and as I do not think it can be considered such now, the fact may serve to illustrate the theory I advance, of the easterly progress of this and the Bermejo rivers. On again touching the parallel of 22° S. it returns as rapidly to its general south-east course, and although the banks are here low and subject to overflows, the main body of the river flows on in a natural bed uninterruptedly to its mouth. From a point just below this last position the Magariños and Van Nivel expedition, which I may mention presently, turned back, giving up in despair the fairest of opportunities.

I will briefly sketch the most important of the expeditions to open up the vast Chaco and its rivers. More than three centuries since, the Royal Spanish Audiencia of Charcas, in Upper Peru, which is the Bolivia of our day, wrote to the king that the Pilcomayo and Bermejo were the most feasible routes by which to communicate with Spain, but though the memorial was supplemented, the influences at work in Spain were too powerful to be overcome, and that country went on to the bitter end in the blind colonial policy, which finally lost to her altogether those magnificent countries. There were not wanting in those rough times spirits with higher aims than the mere acquisition of gold, and the great Captain Juan de Ayolas is pre-eminent amongst these, as the explorer who first attempted to traverse the Gran Chaco, facing its manifold dangers; it is not known with certainty what the fate of this gallant soldier was, as the stories of it are somewhat founded on tradition; he selected what may be considered an impracticable route, and becoming involved in the extensive marshes of the desert lowlands of the Northern Chaco, perished with all his 250 men, not one escaping to tell the tale. Ayolas started upon his expedition from $21^{\circ} 25'$ S. lat., on the Paraguay river, on the 2nd February, 1537. This was the first of many expeditions by various routes across the Chaco, which notwithstanding their sometimes disastrous issue, will finally lead to that easy communication between the east and west of that part of South America, which, besides enlarging our geographical knowledge, will lead to the spread of civilisation over this wild region.

The Argentine Government, in late years, has sent two expeditions into the Pilcomayo, one under Lieut.-Colonel Fonseca, and the other under Major Feilberg, but they were not fitted out with adequate means to overcome obstacles, so that those gallant officers, however willing personally to encounter dangers and suffering in the interests of knowledge, carried failure with them from the start. In the years 1721 and 1741, two daring expeditions were made under the missionaries Patiño and Castanares; neither accomplished much, and the latter was finally killed by the savage Mataguayos. In 1843 General Manuel Rodriguez Magariños endeavoured to *descend* the river, constructing for the purpose

three large vessels whose draught alone assured the failure of the expedition, as far as its river work was concerned. The following year the Bolivian Government sent another expedition of fifty men, in three piraguas and eight canoes. The piragua is a nondescript craft, which would make the naval architect of these times stare with wonder, a sort of floating parallelogram, of no particular proportions, and only remarkable for heaviness and draught. With this party there came a naval Sub-lieutenant Van Nivel, who became the historian, or rather Munchausen of the venture.

Sir Woodbine Parish says that this expedition took its departure from the Salto de Caiza, or Guarependi, which is just on the parallel of 21° S. The account of this expedition by its imaginative author has been received as the truth by De Moussy. Quoting Van Nivel, he states that the expedition had travelled 567 miles, when they were assured by the Indians that the Paraguay river was distant only three days' journey. The Chaco Indian has the vaguest notions of distance, and his estimate of it varies with the means of covering it: for instance, he will tell you that to a given point it is one league on horseback, and two on foot; thus also he describes the rise of the river as Algaroba time, i. e. when the pod of that leguminous tree (*Prosopis nigra*) is ripe, which is in December and January, and the low water, as leaf-falling time, which is July and August. Van Nivel states that after terrible suffering, and having travelled 389 leagues, or 1167 miles, he decided to retrace his steps, which moreover his party were forced to do, being surrounded by 80,000 savages. These statements impair the value of De Moussy's account of this expedition, the fictitious nature of Van Nivel's narrative being clearly proved by a comparison of the known distances on the Pilcomayo. The expedition turned back from a point in $22^{\circ} 5'$ S. lat., and $61^{\circ} 30'$ W. long., and accepting Sir Woodbine Parish's account of the point of departure, it is clear that they had travelled only about 120 miles, which is about one-eighth of its navigable extent. If we adopt this we are within the geographical limits; if, on the other hand, we could accept the exaggerations of Van Nivel, and estimate the length of the Pilcomayo by his measurements, we should have to place the sources of our river in North America.

The Chaco Indians gather in small tribes of from 300 to 1000, hostile to one another, and as it is well known that in 1844 there were not 30,000 Indians in the whole Chaco, it is clear that Van Nivel's expedition could never have come face to face with 80,000 savages.

On the 15th of March, 1882, M. Jules Crevaux, a surgeon in the French Navy, who, under the auspices of the French Geographical Society, set out to explore the Pilcomayo, started to descend the river along its banks instead of ascending by its waters, as the Bolivian Government believed was his intention. He had hardly started upon his expedition when, disregarding the warnings of experience, he landed

with his men, and, at the invitation of the savages, moved inland, quite unarmed, where he was immediately surrounded and massacred with his fourteen companions. This catastrophe was, as it were, foreshadowed almost in his last words written to the French Minister, that the Pilcomayo enterprise was a far more serious and difficult one than he had imagined it to be; thus died pitifully the explorer who, in the great cause of knowledge, had often braved death on the Orinoco and Amazons, and one more was added to the long list of victims of Chaco enterprise.

The latest expedition along the Pilcomayo was organized in Bolivia; it was composed of about 100 troops, and was accompanied by a French traveller, M. Thouar, who also, I understood, bore some sort of commission of the French Geographical Society. The party suffered very much, and were harassed, but not actually attacked by the savages, and after wandering considerably out of their course, they succeeded in reaching the Paraguay, and in crossing over to Asuncion, traversing thus the Chaco in a south-east direction, more or less along the river, but in no manner elucidating its geography.

In this brief review of the most important expeditions, I have omitted many of those of the early Spaniards and missionaries, the records of whose deeds are too sensational and fictitious for sober history.

On my return to South America, a few weeks hence, I have to take charge of an expedition for the survey of these rivers, and hope, at a minimum of cost and risk, to accomplish that which, as we have seen, has been the object of so much adventure, and cost so many lives.

The Bermejo.—The Bermejo rises in the hilly region of the interior of Bolivia and the Argentina, and flows towards the plains in many beautiful, but unnavigable, tributary streams, becoming torrents in the summer-time, on the melting of the snows. The river does not assume any considerable proportions until it reaches the valley of the Zenta near Oran, in lat. 23° S.; a few miles below this point it receives an important tributary, the San Francisco, and thence, solitary and alone, flows on to its mouth, a distance of not less than 900 miles, over the same incline as the Pilcomayo, without receiving a single tributary that might be said to contribute anything to its waters.

In the year 1869–1870, this river became deflected from its ancient course at the parallel of $23^{\circ} 40'$ S., and long. $63^{\circ} 35'$ W. of Greenwich, and actually wandered about a long time before finding a new bed. One of the most chimerical of canalisation schemes was got up to bring back the erratic waters to their old course. It would be tedious to describe it here; suffice it to say that in the annual rise of 1872 the waters broke away, and taking their general south-east direction, but in a most extraordinarily tortuous manner, formed for the time being an island nearly 200 miles in length by an average of 15 miles width, terminating in lat. $23^{\circ} 45'$ S., and long. $60^{\circ} 28'$ W.

This change of bed in our times enables us to understand the mechanical work which this and the Pilcomayo rivers have carried on for at least many centuries; for to this we doubtless owe the rich alluvial lowlands of the Gran Chaco, which it has at once levelled and heightened from pre-historic times.

It is an interesting fact that the Bermejo, in this instance, as in its numberless changes of less magnitude, has manifested a tendency to swerve to the eastward, and although this has not been universally the case, it has been sufficiently so to suggest the idea of some physical cause, particularly as the same influences seem to have been at work on the middle and lower sections of the Pilcomayo. When the waters of the Bermejo arrived at the position just given, up to which they were henceforth to be named "Teuco," they overcame all obstacles, and discharged into the old Bermejo, by two mouths, but a few miles apart, but finally gravitated to its present outlet, the upper mouth closing and silting up with many thousand tons of sand and debris, which precipitated there upon the first obstruction. Thence it flows, winding about very much, but not more so than the average interior rivers of most countries, and it empties into the Paraguay at lat. $26^{\circ} 53' S.$, and long. $58^{\circ} 28' W.$, 60 miles north of the city of Corrientes.

The Bermejo, like the Pilcomayo, has been the object of many expeditions to open up its waters to navigation, and thus establish an outlet for the many rich products of Bolivia to the Rio de la Plata, and thence to Europe. These matters have occupied the attention of such men as Humboldt, M. Bonpland (whom I had the honour of knowing personally), Juan de Ulloa, Azara, Sir Woodbine Parish, my father (Captain Page), and many others. Between the years of 1853 and 1858 my honoured father, under the auspices of the United States Government, explored the fluvial system of the Rio de la Plata, and visited the interior of the Brazilian province of Matto Grosso, that of Chiquitos in Bolivia, the whole of Paraguay, and many of the Argentine provinces, during which, with the assistance of a staff of competent officers, he made extensive collections in botany and natural history, having with him a taxidermist for the preservation of rare specimens in ornithology, all of which were deposited at the Smithsonian Institute at Washington. He made track surveys of all the rivers so far as he examined them, and established wherever he went, with the most approved instruments, those positions which are the standards to this day used in the cartography of those countries. In the course of these explorations he twice entered the Bermejo and once the Pilcomayo, ascending the former to a distance of 900 miles by river course, reaching a point called the Pampa Blanca or White Plain, whence he returned, paradoxical as it may seem, on account of the excess of water which had flooded the country, and he feared his little steamer *Alpha* would be left stranded in the interior, in case of a sudden fall, the course of the river being unrecognisable.

The results of these explorations are embodied in a voluminous work, 'The La Plata, Argentine Confederation, and Paraguay.'

This was the only expedition up the Bermejo undertaken with purely scientific views. The most important of those for commercial purposes was that of 1871 under the Bermejo Steam Navigation Company of Buenos Ayres. A preliminary examination of the river was made by my father for this company on the recommendation of the Argentine Government, but subsequently they employed other agents and unsuitable vessels, all of which, with one exception, became shortly total wrecks in the river, and formed serious obstructions to its navigation; altogether there were no less than seven wrecks lying in the river. An eighth steamer, built expressly for the river, was added to the wrecks just before I entered the river in 1885.

The disastrous results of several of the expeditions I have cited, and those of many others of minor importance, have conduced to give these rivers a very bad name, and to lead to the belief that the interior of the Chaco was uninhabitable. In short, it seemed at one time as if the problem of the navigability of the rivers was to be abandoned as insoluble.

Enterprise in the Gran Chaco is one of the safety-valves for the excessive energy of the Argentine people. Thus the Minister of War, Dr. Benjamin Victorica, in 1884 organized and headed in person an expedition, or series of expeditions, into the Chaco, the one commanded by himself personally, taking the route along the Bermejo river, along which, at intervals of 15 miles, in a straight line, he left permanent garrisons, and finally established the headquarters of the brigade, which was to remain on that frontier, at Presidencia Roca, a point supposed to be eligible, but which proved very much the contrary.

The Minister was not slow to perceive the advantages and importance of the strategic line he had established, and that it was clearly an effectual bulwork of protection to the settlers fast pouring into the South and East Chaco, inasmuch as it prevented the warlike tribes of the Central from invading and devastating the settlements on the Paraná.

I have always entertained and asserted my own opinions as to the question of the reduction of the Chaco tribes, taking preferably the side of mercy and of their non-extirpation, overcoming them rather by stratagem and a show of force combined.

Nations are overawed by a display of forces and will hesitate to strike a strong opponent; thus it has become a dictate of common sense to be well prepared to be the first in war although wishing at the same time to be the first in peace; the Chaco tribes are no exception to this rule, and I am safe in saying that they will *never* strike if they see vigilance and power, but will *unfailingly* do so if they see slackness in these conditions.

Shortly after Dr. Victorica's return from the Chaco, he sent for me

and said he wished me to go to the Bermejo and examine it for once and all, to settle the question of its navigability, and report to him upon it, as a means of permanent communication. He did me the honour to add that he knew he could rely upon my word, and if it was navigable, he wished to know the means that should be employed to secure a practical result in that direction. A steamer just finished, was placed at my disposal for the purpose, and I was to report how she would do for the work.

I found the steamer a first class one of 110 feet by 18 by 5 depth, fitted with powerful horizontal engines, all built by Messrs Rennie of London, but she was unsuited for the work, and I told the Minister so, and said I would do my best with her, although he must not be surprised to hear of her loss. Interior rivers everywhere are more or less obstructed by snags, rocks, and other little inconveniences, but the Bermejo, I am sure, would carry off the palm if we could have a river show, and it was extremely hazardous to attempt its navigation with the steamer *Teuco* in the face of the many disasters that had taken place in its waters, and counter to the opinion of the entire naval community, with the exception of those of Lieuts. Leon Zorilla, and Juan Saenz Valiente, both of whom were afterwards placed under my orders, and this state of affairs assured me a great pressure of discredit in case of failure, which contingency, however, somehow I did not take into account.

To such a state of terror had this river, now so gentle in the hour of its defeat, reduced some minds, that a captain of a merchant steamer having occasion to go into it and ascend 60 miles, in the Government service, on his return feared to put his vessel's head down-stream, and literally performed that extraordinary feat which heretofore we had all thought was pure fiction, described by the Commodore's wife in one of Fenimore Cooper's novels, as "cutting the water most beautifully with her taffrail," and he actually descended stern foremost, laying out lines ahead on either side, and paying out on them, as he dropped down, occupying thus fifteen days in covering a distance which has been since compassed repeatedly in six hours. I mention this incident to show that however tangible dangers may be, they are augmented by the timorous, who in avoiding Scylla are apt to fall upon Charybdis.

No wonder that even the minds of ministers, though they might be like adamant, should be affected by these dribblings of weakness, just as marble is worn by the constant dripping of soft water.

Captain Page in his work, which I have alluded to, describes the Bermejo as "a long, narrow, and tortuous river, one of nature's highways, which could be navigated by vessels of light draught." Participating in his opinion, and having had as a basis an extensive experience with him in all his surveys of the La Plata system, I considered myself, in spite of all the prognostications of evil, quite safe in undertaking the Bermejo task, although dissuaded by the Governor of the Chaco Austral, General Obligado, who kindly expressed his regret that a

person whom he esteemed should run the imminent risk, amounting to a certainty, of obtaining discredit by failure.

Having shipped a crew of eighteen men, and accompanied by two naval officers, two engineers, and my son Nelson, a lad of twelve, I left Buenos Ayres with the steamer *Teuco* on the 25th of June, 1885, and a few days afterwards entered the decried Bermejo, whose forests, then under the sole dominion of the savage, excepting where held by the garrisons lately established, now resound to the beat of steam machinery, engaged in working up their timbers; and whose virgin fields are ere this yielding abundant crops, and are being stocked with thousands of horned cattle, which are suddenly found to thrive amazingly on the varied grasses, several of whose species I have seen in England. As we ascended I recognised many of the familiar points quite unchanged; the river was then falling, the usual season of rise being December, reaching its climax in March and April, and falling again to its normal and lowest stage in May and June, in which it continues up to December again. It soon fell to its lowest, and remained thus during the whole term of my first sojourn, aggravating immensely the difficulties of my situation with my unsuited little vessel; it was, however, obviously an advantage in another sense, as it enabled me to see the river at its driest, as I was indeed soon to see it in all its fury. My vessel was drawing nearly four feet; nevertheless I got safely over the bad passes without accidents, beyond the starting of rivets, which were soon replaced by fishing in bolts by a simple process known to any seaman.

The first obstruction of any importance is the wreck of the twin-screw steamer *Leguizamon*, which lies in the very centre of the channel, and was at that time with her deck partially out of water, and piled up with a perfect promontory of drift-wood. The second difficulty was the so-called *falls* of Yzo, which are nothing but a sharp incline of about two feet in the mile, over about that extent, which causes the water to run swiftly and eddy about and look formidable to the uninitiated. This fall is in lat. $26^{\circ} 17' S.$, and long. $59^{\circ} 23' W.$; it exactly corresponds with one of the same nature in the Pilcomayo, both being of a compact argillaceous substance, which resists well the friction of the waters, and both are on the same meridian of longitude; the same coincidence obtains along the meridian of $60^{\circ} W.$, and again in that of 62° , there being but a very slight variation in that of the Pilcomayo on this occasion, its fall tending a little to the northward and westward. These facts go far to prove an analogy between the two rivers. Once above the Salto de Yzo, I presently had to encounter the passes of the wreck of the *Lavarello* steamer, and that of the *Yankee*, both of which were overcome without accident, although they are uncommonly dangerous.

Shortly afterwards we arrived at the "Vuelta del Yankee," where I saw an ominous-looking placard on a tree commemorating the difficulties that vessel had to encounter at this point; here I was brought up

"all standing" by a wide and excessively shallow reach, having only nine inches of water, over which I finally had to get my boat, with her four feet draught. On the right side there was sufficient, but barely so, of water, rushing over a clay bed, but filled with firmly-embedded iron-wooded trees, as if purposely gathered there to defy all comers. After a close examination I found the bank only about 70 yards in width, and knowing the shifting nature of the river's bed generally, I immediately constructed a chain-drag, attaching to it firmly in an upright position four pickaxes which I happened to have, and then laying out my best anchor on the other side of the bank in deep water and anchoring close by it a stout flat boat which I had taken the precaution to bring with me, I made lines fast to either side of my machine, and, bringing both to the steam winch on board, after passing the off one over a snatch block hooked on to the flat, and thus hove the submarine harrow backwards and forwards, when, as I had expected, it gradually worked a small channel for the current which, I thought would, like most people, only require "an inch to take an ell," and heaving in occasionally with my combined winch on the chain, in ten hours I had the satisfaction of seeing the vessel above this seemingly invincible difficulty. I was quite sure that on my return I should find a channel opened at this point; it so happened, for I found the whole bank cleared away, and two fathoms of water in its place; this incident will give a fair idea of the average bed of the Bermejo, and explain the facility with which it shifts its channels, as the waters encounter an obstacle to deflect them. I have often had my vessel take the ground, and before any ground tackling could be got out, swing round with great violence, the counter-currents caused by her temporary obstruction having eaten away the shifting sands with extraordinary rapidity. A similar incident caused the total wreck of one of the Bermejo Company's steamers; the captain, being a civilian and unversed in such matters, having incautiously laid out an anchor down-stream, upon which his vessel swung in the manner described, and after dragging the anchor with her into deep water, she sank stern foremost. Having thus overcome many obstacles, I arrived at Presidencia Roca, about 300 miles from the mouth of the river, thinking I had got over the worst of my troubles, after a journey of fifteen days, done leisurely, cutting wood for fuel, examining the river, and making a track survey, on which were carefully laid down the sites of hidden dangers, and points to be avoided in future.

After overhauling the condenser, and loading up with fuel, I proceeded on up the river, and six miles above entered what is now the Teuco, which is the channel opened by the erratic waters of the Bermejo, when they departed in 1870 from their original bed, where the high banks, crowned with monumental trees, remain silent witnesses of a quondam river; in many places along this old bed, successive annual floods have covered with rich deposits the low-lying lands, leaving the

tops of large trees peering above the surface. Later on, in the course of my work, or rather in an unexpected and exciting phase of it, I was to enter this old bed, with my steamer, on a life-saving expedition, the whole district being under water.

I had scarcely entered the Teuco before I became aware that I was face to face with the savages, and that also the dangers from sunken trees had become multiplied threefold. After a few days' run, however, we emerged into a broader section of the river, where the banks are lined principally with the soft alder and varieties of willow, and were consequently safe by comparison, although these trees are continually dragged into the river by the million, others springing up to replace them, as if by magic, under the influence of the splendid climate.

It would be impossible for the least sentimental not to admire and feel the influence of those rich woods, clothed in perpetual verdure, the trees entwined by the Paraguay jasmine, with its delicate white and blue flower, whose fragrance is perceived as you run along the banks, and covered with other climbers, parasites, and orchids, in great variety; there is a certain richness of growth in these wilds, filled with the wild pineapple, which is unlike the rankness of the Brazilian tropical vegetation, so suggestive of jungle fevers. A Mr. Plaisant, in 1854, by direction of the Minister of Commerce of France, made an analysis of the woods of Paraguay, which practically may be said to be identical with those of the Chaco, and he concluded that they might be advantageously employed to take the place of those used in Europe for cabinet work. Many of them are certainly very beautiful: the tatané, *Porliera hygrometrica*, compares favourably with the bird's-eye maple; the palo rosa, the Guayacan *Cesalpinia melanocarpa*, a variety of Lapachos, the urundey, curupáy, and curupayná, the quebracho, with a hundred others, all of hard indestructible wood, when used in the earth or water, and which would hold their own with any of the woods of Europe or Asia.

Mr. Plaisant classified 39 species of superior quality, useful for naval construction and cabinet work, exclusive of a great number which were not analysed by him, but which had their special application for medical and domestic use.

Most of the trees I have enumerated are actually used in Argentina, in great quantities for shipbuilding, fencing, telegraph lines, and railway sleepers, serving in this last capacity better than iron. It is one of the beautiful dispensations of Providence, the provision made in these trees, as fruit-bearers for the "children of the forest." The three species of algarroba, *Prosopis nigra*, *alba*, and *Algarrobilla*, all produce the long locust-pod, which, with honey, is said to have constituted St. John's only sustenance in the wilderness. If so, the Apostle had not such a hard time as appears at first sight, for this same pod is a staple article of food with the Chaco Indians, who pound it up and make it into a bread,

which is very sustaining. They also brew from it an intoxicating beverage, under the influence of which they become uncommonly dangerous. This pod is very fattening food for cattle and horses, having a great percentage of saccharine matter, but the grasses grown beneath the trees are inferior to those of the open fields; on the other hand, their far-spreading and close-leaved branches afford a grateful shelter to man or beast from the midday sun. The presence of the algarroba is an indication of high land, not subject to overflows; the alba species is employed extensively in the manufacture of wheel-hubs and furniture, and its bark is good for tanning purposes, as is that of many of the Chaco trees, and a majority of the window and door frames of the older houses of Buenos Ayres are made of it. The "palo santo," holy wood, or *lignum vitæ*, is not found in the Chaco south of the twenty-sixth parallel, but is seen in quantities north of that line, where I have seen many fine specimens over two feet, although, generally, they do not exceed 12 inches in diameter; this wood, so extensively used for blocks and bushings, is so full of resinous matter that it will burn like a candle. I have often used it as fuel, although with certain qualms of conscience in using for the purpose such a valuable, not to say precious, timber.

I should require to occupy your time beyond all reason were I, however concisely, to go further into the botanical wealth of the Chaco, but I venture to hope that some day it will be considered of sufficient importance to couple a complete study of the science, with that of the geography of that region. I may mention, however, two or three examples of the most useful plants. There grows, generally, within the radius of the forests, the caraguatá, of the family of the Bromeliaceæ, from which the Indian obtains a strong fibre, which he converts to manifold domestic uses; it is said to be the fibre known to European manufacturers as the Batista Ananá, but of this I am not in a position to say anything. The caraguatá also answers as a water reservoir, where the rainfall is providentially stored, giving the aborigines a means of slaking their thirst in their nomadic wanderings during the sometime droughts from which the lowlands suffer.

The edible wild fruits of the Chaco are very numerous; amongst a hundred I might mention the chañar; vinal; guayabo, a fine fruit which I saw only along the lower Bermejo; the ubagay, which is the passion flower, and gives out there a large but rather insipid fruit; and the manduvira, a wild almond. The Lacteas are several in number, and produce fine fruit, and the woods are full of the wild pineapple, which, if cultivated or allowed room to grow, would doubtless produce a fine fruit.

The exploitation of the timber industry has occupied many thousands of people, and been the means of reducing to a quasi-civilisation many hundreds of the aborigines; this has led to the development of the

Austral Chaco along the borders of the Paraná, where are now to be found, in the late haunts of the savage, many small towns and very large agricultural colonies, prosperous beyond their own hopes, and connected by rail and telegraph, such as the Ocampo, Florencia, and Las Palmas, two of which are owned by Englishmen, the latter by a personal friend of mine, Mr. Richard Hardy, of a well-known firm of Manchester, who has a concession of 360 square miles, upon which he has settled hundreds of steady workers, assisted by modern machinery, for the growth of the sugar-cane and its manufacture into refined sugar and alcohol, all under the best possible organisation.

This colony was not long since inaugurated under the patronage of the President of the Argentine Republic, and is in a highly flourishing state. Mr. Hardy, who is a most estimable and thoroughly reliable gentleman, assures me that the Indians are the best labourers in his colony, being the most docile and steady, if a trifle more indolent than the so-called civilised workman.

There is another colony, established within a few months, on the left bank of the Bermejo, about 140 miles from its mouth, and opposite to the new Presidencia Roca; the labourers are said to be supplied with all the modern agricultural appliances, and are quietly settled on a Government concession of no less than 270 square miles. The owners of the land have to my knowledge asked for quotations for a couple of steamers, to open up a direct communication with their colony.

If you consider that these lands on the Bermejo, that up to 1885 were held as absolutely unproductive and useless, have now been conceded by the Government to various enterprises throughout the entire extent of 400 miles from the mouth of the river on both of its banks, you will be able to appreciate the answer which time and industry have given to the decriers of the interior Chaco lands along its rivers. I have always asserted that such would be the logical result of a perfect geographical knowledge of those regions, and I am maintaining the same now with reference to the Pilcomayo, which is considered a sort of Inferno.

I need not call the attention of such an audience as this to the great progress recently made in material prosperity and the settlement of its vast territories by the Argentine Republic; this progress has gone hand in hand with the increase of knowledge of the geography of the country. I have spoken to you of but a corner of that vast country; of territories which, despite the sacrifice of so many valuable lives in its exploration, has up to a late day remained in the possession of the aboriginal Indians, who have now, however, begun to fade away before the stronger races of white men.

It is a safe prediction that this region has a great future, possessing as it does an equable climate, tempered by the prevailing south-east and south-west winds, with just enough of the warm and relaxing norther to give a zest to the enjoyment of the others, and stimulate vegetable

growth; a climate which throughout the whole extent of its territories suits admirably the sons of Southern Italy, and in its southern section has been proved to suit the hardier men of England and the United States.

The soil is good, and compares well with the lands of southern and western Buenos Ayres, having in its favour, for agricultural purposes, a far better climate, and is adapted to the growth of cotton, tobacco, the castor-oil plant, the olive, barley, sorghum, Indian corn, rice, the manioc, and many other products of temperate and intertropical climates. Cattle thrive in all the Chaco, attaining an extraordinary development in size, especially amongst the Indian herds, where they depend exclusively upon the grasses and wild fruits such as the palm and locust. The grasses are varied and abundant, and include many of the species highly thought of in Buenos Ayres, which is, *par excellence*, the cattle-growing section just now of the Argentina.

To pick up the thread of my actual ascent of the Bermejo, I continued with little interruption, finding my main obstacle in the draught of the vessel herself. I always found large masses of Indians at the low passes, which are indeed their fishing grounds; at these points which were numerous in the upper Teuco, they would wait, evidently in expectation of some catastrophe or something giving them a chance to make an attack, which was often threatened but never took place on this voyage, although I often had large numbers about me at one time, without however relaxing that vigilance which certainly deterred them from their practices.

The savages on these occasions would be got up in their war paint, many decorated with ostrich feathers, but they generally kept their arms out of sight, but doubtless handy, and would come to us with articles for barter, consisting of dried fish, necklaces, a few bows and arrows and war clubs, the skins of wild animals, and in fact the animals themselves; my son obtained there a fine specimen of the ant-eater.

I worked my way up to within a few miles of the Rivadavia colony, which is not flourishing, owing solely to its want of an easy communication and transport; here I found stretching right across the river, one of those hard argillaceous beds already spoken of, which barred the way effectually as I had not the means of overcoming it, although it had nearly enough water for my steamer. I had, however, accomplished fully, and more than the objects of my expedition, as I was clearly in a position to form a correct opinion as to the navigability of the river, and the means to put it into practice.

The Argentine Government has doubtless become convinced on these points, as I am in England to obtain several steamers for the Bermejo and Pilcomayo river squadron, and a special vessel designed to clear them of their obstructions.

As on former occasions, I was favoured at this pass by the presence
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of at least 500 Indians, and I confess that I felt a wicked desire to visit my disappointment at not passing upon *them*, particularly as they had exasperated me for many days and nights, following me persistently.

I commenced my descent, which was accomplished in 100 hours running time, under very great difficulties and dangers, the latter being considerably diminished by my having laid down on my rough draft the most dangerous places, which I was enabled to verify a hundred times, by actually seeking and touching the snags if beneath the surface of the water. I arrived at Corrientes with my vessel roughly handled but quite safe, and my officers and men much fatigued after their arduous work, which, I must say, they went through manfully. I have never thought of those rough companions without feelings of emotion. Some of them are still with me. I had experienced nothing but kindness and attention from the gallant officers and even the men, who were roughing it, along the Bermejo, and I have made it my special business to acknowledge it at all times. I was soon, however, to requite with interest all they had done, by a service which would well illustrate the "casting of their bread upon the waters."

If I have not been too tedious I would like, in conclusion, to explain what I have just said. After anchoring at Corrientes, I had not had time to write out my report for the Government ere I received a telegram from the Brigade Commander on the Bermejo, Colonel Uriburu. It said, "The river rises in a most alarming manner. Come at once." This was followed almost immediately by another: "River alarming. Come to us. Run night and day."

Knowing, as I did, the nature of the river, I immediately got under weigh, although both vessel and crew had to limp along. When I arrived at the Bermejo's mouth, I found it rushing out like a torrent, it having risen evidently close behind my down trip, and the Paraguay being low, the Bermejo literally fell into it in a sort of rapid, bringing down such a mass of floating trees that it obliged me to stop the wheels several times. I found it utterly impossible to get into the river with advantage, using wood as fuel, so after working for hours in vain, I ran to Corrientes and took in coals; with these, after a two hours' struggle, and being whirled around like a top in the enormous eddies, I got fairly into the river and began my ascent. I found the current everywhere about eight miles an hour, but as the river was high, and still rising fast, I unhesitatingly followed the great eddies, and succeeded in getting on quite fast, although in some turnings I had to use both steam and warp. I had resolved, as may be supposed, to lose no time, but the Bermejo had rarely been steamed by day-time in safety, and it was extremely dangerous work then at night, particularly under the overshadowing high banks which made the course quite black. On this account I had stopped the first night at 11 o'clock; at daylight a canoe arrived in the midst of a storm, bringing me two telegrams, which said: "Come

quickly, we want you," and again, "If you do not arrive soon, or other help arrive, garrison will be drowned or starved."

This was the last communication before the wires were carried away. Imagine my case; struggling with such a torrent of a river, with a poor crippled little steamer, and receiving such a call! I resolved from that moment not to rest nor stop, except where it might be absolutely necessary, until I had relieved the troops and their many families, or my vessel had perished in the attempt.

That night at one o'clock the engines stopped suddenly, having bent the connecting-rod of the air-pump, and leaving us in a most precarious situation; however, that "little cherub which sits up aloft and watches over poor Jack" was true to us on this occasion, for although the vessel flew down the river like a rocket, undoing in a few hours almost all I had covered during the day and part of the night, it being impossible to bring her up, she struck the high banks but once, causing no serious damage. So soon as I brought the vessel to her bearings the damage was repaired, and at eight o'clock in the morning we were again under weigh. Numberless accidents happened to us on that race for life: we had the wheel and side houses much damaged by contact with fallen and floating trees, and the upper deck railings were swept clean away, many trees falling upon us and obliging us literally to cut the vessel clear of them; the banks also often fell upon us with great violence, as they had to be hugged to avoid the current. After four days' run in this way, which was exciting enough, at eleven o'clock at night I heard a most unusual roar, as we suddenly debouched into what might have been my preconceived idea of a pandemonium. I found myself in the presence of three mouths. Which to take was the question. My sketch of the river, which I hastily consulted, said to the right, and that I found correct in the morning.

I considered, however, that common prudence did not warrant my running into a danger, the nature of which I could not see so as to meet properly, and which was evidently abnormal, and reluctantly, therefore, I stopped until daylight, and waited as patiently as I might under one of the most violent storms I remember to have witnessed in these parts. With the first streak of dawn I got under weigh, and found that the river had broken through a narrow neck, opening up a new channel, where it struck one of those argil beds, which resisted its erosion, and the waters were pouring over this place from a height of four feet on the right, the bed inclining downwards towards the left bank, where, if the fall was less, there was compensation in the shape of the most awe-inspiring whirlpools. It was a most imposing sight, but I had to pass or acknowledge defeat, and then, how about those comrades who had put their faith in me, and were watching for us higher up?

I got over the pass, after being knocked about and thumped against

the embankment, which crumbled in tons upon us on the least provocation, and after five dashes for it, succeeding along the left bank, where I passed eight times afterwards, but always took the centre to cross downwards. An hour later I came to the first garrison, where there were about twenty men, whom I ordered to remain there, although completely surrounded, promising to pick them up afterwards, which I did; at this point I lost a soldier of the 12th Regiment, who fell overboard, it being impossible to save him in the great current, although he was known as a good swimmer. The next morning I passed Fortin Plaza, where the houses just showed their roofs above the water. Here I picked up a dog all but starved to death. I shall not soon forget the joy of that poor animal—he had very little more than standing room; he became my affectionate companion.

A few hours after this, at 8 o'clock at night, having had a most trying day of hard as well as anxious work, I was running along watching every inch of the waters we covered, and knowing that I was near the spot where I was to find two hundred men, and many women and children, or not, as Providence might have been merciful to them. It was a solemn moment that crisis! within an hour, perhaps less, I was to know whether my struggle with the elements had been in vain! Perhaps I had arrived too late to save those people from annihilation. Nothing had been heard of them for days; no one knew more than I did, and that was through the telegram, announcing that if I did not arrive soon the troops would be lost; and I had carried this heavy responsibility for five days, after advising the Government, by wire from the station at Puerto Expedition, what had happened, and that I should do my duty. I had the side and top lights put up—an unusual proceeding, as we never had to encounter any vessels or craft—and the bugler sounded attention at intervals, as was blown also the steam whistle. I listened anxiously for signs of life, and felt that there was something very imposing in that dangerous night march though the waters spread out like a sea. Not a sound was to be heard but the beat of the engines, and that steady thud peculiar to the patent float; all on board were listening with bated breath, in eager expectation, when as we rounded the last water-covered point, where I knew my lights should be seen if the troops were still there, I thought I heard faintly a bugle call—a second time I heard, or thought I did so, when suddenly a ringing cheer on board told me that my hearing had not deceived me, and that I had come in time. When the cheers of the troops and blowing of bugles allowed us to speak, I could not help saying to the Colonel Commandant, "I am more pleased to see you than you can possibly be to see me," it would be difficult to convey to your minds the energetic sincerity with which he answered, "No, comrade, no! not so fast; nothing can equal our joy."

I found the troops with very little more than standing room, surrounded by deep waters, and the danger now was that the ground would

give way altogether; but they were safe as compared to seventy soldiers and fifteen women and children who composed the two garrisons of Arias and Matorras, who had managed to form a junction at the latter place, but had not had time to fall back on the main body at Presidencia, and were completely cut off about 15 miles higher up, but along the old Bermejo bed. Delaying only to take in fuel, and the Indian Cacique Vicente as a guide, I left Presidencia to go to the rescue of the Matorras party.

It was difficult to determine what course to take, the whole country being flooded, and the water rushing out of all bounds to right and to left, made the management of the steamer an anxious task, she being dragged several times broadside on by the violent side currents. After some hesitation, I resolved to follow the old Indian's advice, although it took me through thick bushes and trees, whereas a clear stream was running from a right angle to the course he indicated; but as a precautionary measure I threatened to shoot the Cacique if I found he had deceived me and delayed my vessel on her important errand. After running about three or four miles, dodging the trees here and there, I found that the bed of the old Bermejo became more pronounced and the water deeper. Call after call of the bugle, and many rifle shots, elicited no answer, and night approached with a swiftness such as I did not remember to have witnessed before. In the dusk I thought I saw dimly, with my glasses, something like a flag in the top of a large tree; I was not deceived, and making for the place, I saw two men just below the flag, signalling, and soon we were deafened by the four bugles and cheers of the poor fellows below.

We had come indeed in time on this occasion, for they were completely cut off, without even a canoe, nor had they wood fit to make a raft, or any other life-saving means, and they had only one day's scanty rations of beef, and not even an ounce of their favourite beverage, yerbao, with which the Argentine soldier will march for days without other sustenance. I took away all of these poor fellows, with their commander, Captain, now Major, Arias, and next day arrived with them safely at Presidencia Roca.

Having selected, with Colonel Uriburu, a more eligible point for headquarters of the brigade, I transported the whole of the troops to it, having to cross sixteen times the bad pass I have described, and safely deposited them, with all of their baggage and stores, and transport waggons, bullocks, horses, mules, goats and sheep, without the loss of a single animal or article. Having thus done my best I returned to Corrientes, having ended my study of the Bermejo in a satisfactory manner.

I have described this little incident as it may well serve to illustrate forcibly what I said as to the mechanical work of the Bermejo and Pilcomayo, and it will also throw light upon the

geological process which has formed that magnificent region, the Gran Chaco, and because I believe that these rivers having performed their work during many centuries, have come down to that epoch when they may be kept in order and utilised in another way, the scientific engineers of these times being destined to lend their abilities to that country, where I am sure they will find a future happy hunting-ground.

After the reading of the above,

MR. CLEMENTS MARKHAM said that when he first became a Fellow of the Society, now many years ago, he remembered that they were all deeply interested in the United States expedition under Captain Page, which was sent out about that time, to explore the Paraguay river and its tributaries. Geographers rejoiced at the excellent work done by Captain Page. It was such work that it must form the basis of maps of that region for all time to come. The Society now had the pleasure of welcoming Captain Page's son, who had so worthily followed in his father's footsteps. The Gran Chaco was assuredly a most important region, lying as it did between the plateaus of the Andes on one side, and the great fluvial highway of the Paraguay, leading to the Atlantic, on the other. Its very name was suggestive of riches. In the Quichua language "Chacu" meant a hunt, but under the government of the Incas of Peru the word was used for that festival when they surrounded and numbered their flocks. It was a counting of wealth. Hence the *Hatun chacu*, or Gran Chaco was so named by the Incas, because those vast forest-covered regions to the east of their mountain homes were a source of wealth to them in wild animals, precious drugs, and the highly prized harvests of coca. In the distant future the channels which flowed from the homes of the Incas across the Gran Chaco, were destined to bring down the produce of the Andes to markets beyond the Atlantic, but that time had not yet arrived, although he believed it was near at hand. The Gran Chaco was still scarcely known, only portions of it having been explored. It was still one of those regions to which geographers might point when they were tauntingly asked what there was left for them to discover. He believed that the Bermejo was the only river of the Chaco which had been thoroughly explored, and Captain Page had described the difficulties and perils surrounding its navigation. The course of the river appeared to be strewn with the wrecks of steamers. The grand stream to the north of the Bermejo, called the Pilcomayo, was not yet explored. Its name, like that of the Chaco, must have been given by the Incas of Peru, meaning not the river of birds, he thought, but the river of garlands or wreaths. In the extreme northern part of the Chaco there was another river which Captain Page had not referred to, but if he remembered rightly it was a river in which his honoured father took great interest, namely the Otuquis, which has been looked upon as the shortest and best channel for opening a route to Bolivia. The information possessed by the Society respecting the exploration of many parts of South America was of old date, and he did not remember that anything had been heard of the Otuquis for fifteen years. They had been told by one authority that it lost itself in a swamp, and by another that it was a fine river, only choked with islands of grass and reeds, such as Sir Samuel Baker had described in the upper Nile. More accurate information respecting the basin of the Otuquis would be very acceptable. One of the most interesting points in Captain Page's paper was his suggestion as to the way in which the great plain of the Chaco had been gradually raised and levelled by the over-flowing of its rivers in the course of ages. It was an old and perhaps exploded geographical theory that rivers flowing from north to

south had a tendency to work laterally to the westward; but Captain Page had told them that the rivers of the Chaco worked to the eastward. He was inclined to suspect that although they had worked in one direction during the historical period, they were tolerably impartial as regards both banks, and that in the course of ages they had oscillated east and west, and would continue to do so until, by the exercise of great engineering skill, they were confined to their banks. He wished, in concluding these remarks, to express the pleasure he felt at the presence of a distinguished Argentine explorer. English geographers had watched the work that was being done by their Argentine fellow labourers, and by the society at Buenos Ayres. They had appreciated the scholarship of Vicente Lopez, and the admirable work of such men as Francisco Moreno and Ramon Lista. He hoped that the feelings of cordial appreciation entertained by members of the Society for their Argentine brother geographers might be conveyed to them, and he wished all possible success to Captain Page in his future enterprises.

Colonel Church said that the Argentine Republic seemed to be divided into two sections, that of the Pampas without forest, and that of the Chaco which was a forest-covered country. According to all the old geographers, the Chaco extended from about latitude 19° to 29° , the southern border making a rather sinuous line westward until it reached about longitude 64° . Curiously enough the rains of the Chaco district did not occur during the rainy periods of the Pampa district; but from November to May there was a veritable downpour, and the country became flooded, filled with lagoons, with here and there an island or small hill. At the head waters of the Bermejo there was on such occasions a lagoon 40 leagues across. It was a very difficult problem to him how the Pilcomayo and the Bermejo could ever be usefully navigated. The former, 180 leagues above its mouth, filtered itself through a sandy swamp 100 miles in diameter, while above this swamp it was filled with falls, rapids, sandbanks, and snags. The bed of the latter oscillated backward and forward to the extent of 30 or 40 miles, carrying with it great trunks of trees of very hard wood, the specific gravity of which exceeded that of water. The rainy season was succeeded by one so dry that animal life almost perished for lack of water. There was a distance of 1250 miles along the Bermejo to its mouth, during which it received but one branch. When the Argentine rivers left the mountains the plains soon drank them up. He ventured to say that the Chaco region got its rains from the north-east winds that blew up the Amazons and the Tapajos and Madeira rivers. There in November they met the cold winds from the South Atlantic, sweeping across barren Patagonia, and the rain was precipitated upon the Chaco, forming the forest district. At the lower fall of the Madeira river the rainfall was 91 inches per year, and he had kept a rain gauge there for three years. In the southern part of the Argentine Republic the rainfall was only 18 inches, while at Buenos Ayres it was 34 or 35 inches. He doubted if the rainfall of the Chaco was less than 80 inches, almost the whole of which was concentrated into a period of six months. The Gran Chaco was almost a lake district in the rainy season, and in seasons of extraordinary floods the Paraguay, the Pilcomayo, and Bermejo overflowed their banks, and created a vast sea, far exceeding in area the overflow of the Nile, the upper Paraguay becoming a great inland ocean, stretching from the high Brazilian shore westward across the undulating Chaco, and varying in depth from three to ten feet. This flood district extended northward to the falls of the river Madeira, 11° S. lat., and north-west across the Beni department of Bolivia, almost to the frontier of Peru. In the Beni alone there was a single lake of 20,000 square miles, during flood-time, from two to seven feet deep. In all this flood district nature was hard at work distributing and spreading over the flat lands the detritus of the Andes. It was estimated that the Bermejo river alone delivered yearly over 6,500,000 cubic

yards of detritus into the Paraguay. A curious feature of the inland of South America was the hollowing out between the Andes and the Brazilian mountain system. Starting from the mouth of the Rio de la Plata, at Buenos Ayres, a line might be traced through the Chaco, perhaps about 400 feet high in the northern part, and rising probably to 1000 feet between the head waters of the Tapajos and those of the Madeira. Perhaps the slope of the Amazon from the mouth of the Madeira did not exceed half an inch per mile. San Antonio, on the Madeira, 578 miles above its mouth, and 1478 from the Atlantic, was about 250 feet high. From that valley to the Orinoco there was not a point over 1000 feet. There was a similar depression in North America running from the mouth of the Mississippi through to Hudson's Bay. The Gran Chaco district was formerly known, in the time of the Incas, as Tucuma, which the Spaniards afterwards changed to Tucuman, and which signified land without end. In 1289 the inhabitants sent a deputation begging the Inca Viracocha to include them in his dominions, as they had heard so much of his benign government. When Tupac Amaru revolted, the revolt extended to those provinces. He had traced the Inca empire as far south as 33°, east to Santa Cruz in Bolivia, and north-east to the Beni river. The Gran Chaco district was a great barrier to the early *conquistadores*. In 1527 Sebastian Cabot ascended nearly to the Bermejo, so that when Pizarro was battering against the north end of Peru, Cabot was trying to reach inland up the Parana river. The Brazilians claimed that while Pizarro in 1526 was plotting the conquest of Peru (as yet undiscovered), a Portuguese *conquistador* crossed the Chaco from Brazil, and raided the Peruvian frontier. The echoes of Pizarro's conquest having reached Spain, numerous expeditions attempted to cross the continent, one of which founded Santa Cruz in Bolivia. Under viceroyal rule, and during the sixteenth century, numerous were the efforts to subdue the Chaco, and make it an avenue from the Atlantic to Peru, that Cape Horn, Panama, and the freebooters might be avoided; but the savage tribes, swamps, lagoons, and floods defeated them all. It is evident that all effort had for years been abandoned when, in 1756, the Spanish commissioner Flores wrote to the Marquis de Valdeliros from Paraguay that "the archives of Asuncion contained nothing about that interminable gulf of land, the Chaco." The missionaries from Salta penetrated to the Bermejo in 1590, but their missions were afterwards destroyed by the savages. They penetrated to the Pilcomayo in 1719, and in 1721 Padre Patiño explored the river; although in 1672 de Armenta y Zarate had, at the head of a small contingent of troops from Tarija, marched for a long distance down its valley. The Chaco was interesting in a commercial sense. A young nationality was being formed in the Argentine Republic, which had a magnificent destiny. It had an intelligent, energetic, hard-working people, pushing the iron rail over the country, already having 4000 miles of railway laid down, and another 4000 projected. On the southern border of the Chaco the locomotive was already shrieking the knell of the savage. Buenos Ayres had 500,000 inhabitants, and he believed it was destined to be the great city of the world, owing to the fact that by no other route could a magnificent territory of a million square miles find access to the Atlantic. The railway works were being done almost entirely with British money. The British banker had backed up the English or the Argentine impresario. Money was pouring into the country, and it was impossible to discount its grand future. As an American, he was proud to find England acting there with such vigour; for whatever glory she achieved in the line of civilisation, America, as her son, received some little of it.

A vote of thanks to Captain Page terminated the meeting.

*Explorations in the Glacier Regions of the Selkirk Range,
British Columbia, in 1888.*

By REV. W. SPOTSWOOD GREEN, M.A.

(Read at the Evening Meeting, February 11th, 1889.)

Map, p. 196.

TRAVELLERS by any of the great lines of railway crossing the American continent cannot fail to be struck by the contrast when, after passing over hundreds of miles of rolling prairie, with a horizon line like that of the ocean, they gain the first sight of the Rocky Mountains. On none of the routes to the westward is this contrast so pronounced as on the Canadian Pacific Railway. For 900 miles west of Winnipeg stretch the great plains; their rolling billowy downs clothed for the most part in the yellow prairie grass, and often gay with flowers. Near Calgary the purple snow-tipped rampart comes into view to the westward, and as we penetrate through the foot hills, where prairie flats and mountain ruggedness seem for a few miles to be struggling for the mastery, we come suddenly on great bare cliffs with strata tilted at high angles in huge slabs, and at once recognise the singular appropriateness of the name "Rocky" as applied to this range of mountains *par excellence*.

The prairie slopes gently upwards to the westward, so that when we reach the foot hills we are already 3500 feet above the sea.

Following the Bow river for a considerable distance, the railway ascends, with no severe gradient, and reaches the Hector Pass (5190 feet), gaining the last 1600 feet in 100 miles. Then comes the most critical bit of the whole line, the plunge towards the Columbia. In addition to our own engine, a huge locomotive, weighing 117 tons, lets us down the gradient of one in 22½, with the greatest caution, to Field Station, whence we go on our way, following the Wapta river. For miles we seem to be racing the wild torrent, as it roars and foams through its cañon, till at last, issuing from a rugged mountain gate, we enter the smiling valley of the Columbia. Before us the Selkirk range rises to snow-clad peaks, with lower slopes completely covered with heavy forest. The highest peaks are not yet visible, and the dark-green pine forest is the feature which strikes us most. Following the Columbia for about 20 miles to the northward, the line enters the Selkirks by the valley of the Beaver river. Up steep gradients, though not so steep as those in the Rockies, we enter the grand defile between Mounts McDonald and Tupper, whose great, bare, snow-seamed crags almost overhang the track, and so reach Rogers' Pass, 900 feet lower than the pass across the Rockies, and then, down by the valley of the Illecillewaet, the Columbia is once more reached. Making a second crossing of that river, the line ascends the Gold Range, and so, through the grand cañons of the Thomson and Fraser rivers, goes on its way to the Pacific.

In a general way, all these ranges are grouped under the name Rocky Mountains, that being a convenient term for all this cordillera region which forms the backbone of the American continent; but, on the route I have sketched, the term Rocky Mountains is reserved for the range which, broken and twisted as it may be, forms the waterparting of the continent. This great divide we crossed at Hector Pass. The Selkirk range to the westward is entirely bounded by the great bend of the Columbia and its tributary, the Kootenie, and the drainage of all its glaciers finds its way into the Columbia in some part or other of its course. The depression partly occupied by the Kootenie and Columbia is, however, much longer than the Selkirk range, and extends as a very remarkable physical feature for 600 miles north and south, parallel to the Rockies. The course of these rivers from their upper waters, divided by only $1\frac{1}{2}$ miles of flat land, through which a canal is now being cut, to where, after courses in opposite directions of over 700 miles, they at last unite, is an interesting study on any map of the district, and when investigated in detail on the spot, is suggestive of many questions regarding their past history.

The Columbia for the first 170 miles of its course flows northward, while the Kootenie turns southward; but, according to Dr. Dawson, who has examined the drift deposits in the valley, there is abundant evidence in favour of the belief that in glacial times the drainage of the valley was altogether to the southward—boulders have been transported, and the early rivers formed fans of detritus in that direction. It seems, therefore, that some downward movement of the land to the northward must have taken place, which gave the Columbia its determination in that direction. I ascended the Columbia to Lake Windermere, for the sake of seeing the Selkirk range to its termination in the Kootenie Valley, and of gaining some idea of the tributaries coming from the Selkirk Glaciers, and was much interested in the bench and terrace formations, which record the old levels occupied by both lakes and rivers, in the upper portion of the valley. As we ascended the Columbia, deep sunk in its trough-shaped valley, the contrast between the Selkirk range and the Rockies, to which I have already referred, was most marked. The Selkirk range on our right rose in gentle slopes and tiers of foot-hills richly clad in pine forests, and cleft by far-reaching valleys, that of the Spillamachene river being the most important; while to the left the Rockies towered up from almost barren benches of white silt, with a sparse sprinkling of Douglas firs, in great bare precipices of pinkish-white limestone to rugged mountain forms at once. No large tributary joins the Columbia from that direction for 80 miles, only brooks half lost in the shingle brought down by spring torrents.

The Kootenie-Columbia river system is so important a factor in the delineation of the district, that it had first claim on our attention.

The Rocky Mountain range needs a few words more. If we look at a section of the range from the prairie to the Columbia Valley, as shown in the Report of the Geological Survey of Canada, we see that it consists of a series of sedimentary rocks referred to the cretaceous, carboniferous, Devonian, and Cambrian formations; and though the strata are much contorted and overturned, the newer rocks belong to the eastward, while the older rocks crop out to the westward portion of the section. The mountain forms have been determined to a great extent by the lie of the strata. We have the fine castellated form of cleft horizontal strata, that of vertical strata; and, near Banff, every traveller must be struck by the great curved-strata mountains, with their round, sloping backs and steep, scarped faces, more curious than beautiful. The peaks near the Hector Pass are probably as high as any in the range north of the United States boundary—Mount Lefroy and his neighbours rising 11,600 feet above the sea. The heights given for Mounts Hooker and Brown, near the Athabasca Pass, 17,000 and 16,000 feet, are no doubt exaggerated. From the high peaks of the Selkirks I could scan the Rockies for at least 200 miles, and from the arête of Sir Donald, what appeared to me to be the highest group of peaks, bore about due east. Mr. McArthur, the Government Surveyor, at present engaged on the survey of the Rockies, expressed to me his opinion, that though his work has not as yet carried him so far, he has reached points where such high mountains must have been visible if they existed.

I was not able to see as much of the glaciers in the Rockies as I should have wished; one at the head of the charming Lake Louise, at the foot of Mount Lefroy, I visited on our homeward journey in September. This glacier was formed almost entirely by avalanches falling from the hanging glaciers above. One of these occupied a bench, about a thousand feet up, on the vertical cliffs of Mount Lefroy, and during the day and night I was camped there alone, my companion having missed me in the forest; avalanches fell continually, waking the echoes with the roar of thunder. Strangely enough they seemed to fall more frequently between two and five o'clock a.m. than at any other time. The atmosphere, already obscured to such an extent by smoke from the burning forests, that distant views were rarely obtained, and photography was impossible, became charged with clouds, and the weather, hitherto so beautiful, broke with thunder, lightning, and heavy rain.

The most remarkable glacier, hitherto discovered on the Rockies, is situated to the north of Hector Pass, and extends on a rocky bench capping in some places the watershed and surrounding the rugged peaks rising like islands from its midst, as a continuous snow-field for about 30 miles. Mr. McArthur called my attention to it in the first instance and from near Laggan I was able to see a portion of it distinctly. Like the hanging glaciers on Mount Lefroy it sends its ice down by avalanches, forming *glaciers remaniés* in the neighbouring valleys.

From what I have already said, it will be gathered that the Rockies are being carefully surveyed, topographically and geologically. Not so the Selkirks. This, however, is not strange, for with such vast areas to be surveyed, it is not to be wondered at that the department should for the present, have set them aside. The Selkirks are also much more difficult to travel than the Rockies. In the Rockies a pack-horse can be taken almost anywhere, the forests being comparatively open. In the Selkirks horses are practically useless, the timbered slopes being nearly inaccessible, on account of the rank vegetation.

Since the opening of the Canadian Pacific Railway in 1886, travellers have always been struck with the beauty of the Selkirk scenery, but though some excellent photographs have been taken from the railway track, it was difficult to obtain any succinct account of the glaciers, valleys, or mountain peaks. There was no published map of these ranges; so, acting on the suggestion of Prof. Macoun, of Ottawa, I determined to go out and explore these glacier regions of the Selkirks, so far as was possible in the time at my disposal, and give some preliminary account of them, which might instigate and be useful to others who may have fuller opportunities. The Council of the Royal Geographical Society considered that such a report and map as I might be able to construct, would be of sufficient interest and value to justify them in assisting me, by the loan of instruments and a grant in aid of my journey. Mr. Van Horne, president of the C.P.R. Co., offered a free pass on their line, and the managers of the Anchor Line Steamship Company were kind enough to grant us return saloon passages in their splendid liner, the *City of Rome*, for single fare. On June 28th, my cousin, the Rev. Henry Swanzy, and I sailed from Queenstown. He had been with me on glacier expeditions in Switzerland, and he had crossed the Selkirk range in 1884, before the railway was made.

Our kit was somewhat extensive. Besides our ordinary luggage we took with us three tents, blankets, &c.; three photographic cameras (two half-plate, and one a Stirn's patent detective); three ice-axes, rifles, rope, and the set of surveying instruments kindly lent by your Society. On reaching New York we proceeded without delay to Ottawa, where we had the good fortune to meet Major Deville, the Surveyor-General, and in the office of the Survey he showed me all the maps which might be useful, and gave me much valuable information. A MS. map of the line of railway through the Selkirks, on a scale of two miles to an inch, was the most helpful, so I made a tracing of it; and as he said I might trust it so far as the railway was concerned, I have used it as a basis for my map. Some of the peaks in sight from the railway were located, and their heights, trigonometrically obtained by Mr. Otto Klotz, assistant Government surveyor, were set down, but there was no attempt at detail.

On arriving in the Selkirks, we put up at the Glacier Hotel, which is built on the plan of a Swiss chalet. Since all trains halt here for

dinner, it is well provided, and we were most hospitably treated and well cared for in every way. Within an easy afternoon's stroll is the end of the great glacier, the chief source of the Illecillewaet river. Being in full view from the railway, it is one of the sights of the Selkirks, and is already paid due honour in the guide-book. As we look at it from the railway, the fine peak of Sir Donald (10,645 feet high) stands like a great obelisk of rock to the left, and on the opposite side of the glacier there is a pointed forest-clad ridge separating the glacier valley from a branch valley running up into the mountains for about four miles, abounding in beautiful scenery, and headed by the Asulkan glacier.

To fix the positions of the neighbouring peaks, and map out the Illecillewaet glacier and the snow-field from which it descends, was the first work I took in hand. There was great difficulty in finding any place level enough for a base line, but at last I succeeded in measuring a line of 660 yards, on the top of the snow sheds, on the side of the valley opposite the hotel. From this I fixed a point near the hotel, and my fourth station was the summit of the ridge separating the Illecillewaet glacier from that of the Asulkan glacier to which I have already referred. Working on in this manner, I made in all twenty-two plane-table stations, measured four base lines, and from other points took bearings with a prismatic compass. Besides sketching panoramas, we photographed the views from most of our stations, took observations of barometer and thermometer, and from these data I have constructed the map which accompanies this paper. One element at least is wanting, viz. elevations of points which we did not reach. I had a sextant with me for this purpose, but on our very first expedition, with a pack-horse, the animal was seized with a sudden paroxysm of buck jumping, kicked the packs off, rolled on them, smashed the sextant to bits, and broke a valuable thermometer belonging to your Society, but a box of photographic plates fortunately escaped. From that time forward I never again trusted our instruments to the mercy of a horse.

Having acquired some idea of the region round the hotel and the neighbouring glaciers, I was anxious to gain some commanding point, whence we might see what lay beyond the upper snow-field. Sir Donald looked very difficult, but our first long expedition landed us on a little peak on his southern shoulder. From the main peak, which rose 600 feet above us, we were hopelessly cut off by a cleft 200 feet deep. But from the point we reached we had one of the most interesting views it is possible to imagine. Now, for the first time, we saw what the glacier regions of the Selkirks really meant. From the base of the peak we were on, the great snow-field extended for over 10 miles. Beyond it to the southward, and away in an unending series, far as eye could reach, rose range after range of snowy peaks with glaciers in the hollows: peaks and glaciers were simply innumerable.

Looking westward and northward a similar prospect presented itself.

Bearing south-west of us a big ridge rose beyond two intervening mountain ranges. It seemed to us the highest of all, and on my plane-table sheet I designated it provisionally the Big Grat. The face towards us was a black precipice, but the arêtes to right and left rose gradually from snowy ridges which seemed accessible, so I formed a hope that we might some day reach its summit. How to reach its foot was then to us a mystery, but we did in due time, and with less difficulty than we expected, reach the valley above which it rose, and set up the plane-table on its highest crest.

Another group of mountains beyond the great snow-field also attracted our attention. Difficulty as to the transport of provisions prevented our attempting any of its peaks, but we ascended a portion of a fine glacier in its midst. This group I have named the Dawson range, after one whose name will always be connected with the geology of the American continent.*

The peaks in view seemed very uniform as to height, a great number rising to the level of 10,000 feet, and few, if any, reaching 11,000. This I judged from comparison with those the heights of which have been ascertained. They varied much as to form. Sir Donald, some of the lower peaks of the same chain, also some distant summits which I sketched, are bare rock peaks, with glaciers in the hollows beneath, other mountains looked like the Titlis as viewed from the Rigi.

The peaks do not rise so high above the general level of the glacier firs as to be comparable with the higher ranges of the Swiss Alps. They resemble more some of the ranges of the Tyrol. The grand forest-clad valleys of the Selkirks can, however, scarcely be surpassed for beauty. The St. Gothard Valley, and the ranges between it and the Bernese Oberland, including the Rhone Glacier, will afford the best comparison I can think of, but the views obtained from the Canadian Pacific Railway are grander than anything visible from the St. Gothard.

Turning from the snowy regions and looking eastward, an entirely different prospect presented itself. Down below great rock precipices, which, as we sat on our peak, we seemed to overhang, 5000 feet below our feet the Beaver Creek wound its way through green scrub and dark pine forest, like a silver thread. Beyond it a range of hills rose, which in form differed so completely from anything I ever before saw, that I must try and describe them as accurately as possible. They rose from Beaver Creek, first in a slopes of detritus, covered with scrub and forest to about

* The extent of our survey depended almost entirely on the distance to which we were able to carry provisions. This meant that we were never able to be more than a week away from the railway. White men in America cannot be counted on for "packing"; the blankets and provisions they require render the extra amount they can carry of no value. The Indians are the men to look to, but in the Selkirks there are no Indians resident. One family of Sushwap Indians hunt in these ranges, and down along the line towards Kamloops "packers" of this tribe might be engaged who could carry 70 lb. packs, and require comparatively little for their own comfort.

1000 feet; then came vertical precipices for 1000 feet more; the top was in general outline a level grass-covered plateau; and beyond, another nearly parallel valley, drained by a fork of Beaver Creek, defined the plateau at an equal breadth of about half a mile, and about five miles long. At right angles to the precipices overhanging the valleys, a number of low ridges cut the plateau across from side to side; I counted seven of them. They were nearly equidistant, and the ground between dipped in a gentle even curve. If a strip of cloth was laid loosely on the rungs of a ladder laid down flat, a capital representation would be formed of the surface of these plateaux. On the northern side of these ridges an even line of snow lay unmelted, marking their outline with even greater precision. Beyond the forks of Beaver Creek these plateaux continued, but with much less regularity, and I afterwards heard that they are known to hunters and prospectors as the *Prairie Hills*, and that it is possible to ride over them for dozens of miles without difficulty; the approach to them, however, is in every case up steep, forest-clad mountain sides.

So far as I could see, the lie of the strata had nothing to say to the formation of these ridges; and the only explanation I can think of, in the absence of closer examination is, that being in parallel lines pointing towards the snowy range, they are markings of glaciers which moved eastward, towards the Columbia Valley from the high central range, in glacial times, and that since the passing away of the protecting ice, Beaver Creek has sculptured out its valley at right angles to the former drainage lines.

From what I saw on this excursion up the ridge of Sir Donald, I came to the conclusion that our next expedition must be to cross the great snow-field and obtain some knowledge of the valleys beyond. Now came a great difficulty; it was almost impossible to get the help of men to act as porters. After much negotiation, two respectable young men, working as navvies on the railway, volunteered to come. So, packing up a tent and provisions enough for about a week, we started up the eastern side of the glacier, under the cliffs of Sir Donald, and camped the first night on a rock which I have called the *Perley Rock*. This lay above the snow-line, so we had to carry up loads of firewood from the upper limit of dwarf gnarled timber.

At daybreak next morning, making a sledge of the tent-poles, and packing all our goods on it, we harnessed ourselves and set off up the gentle swells of snow towards the summit ridge. The snow was crisp and the sledge worked admirably, and in little more than two hours we were on the watershed. Here the glacier field was almost level for about two miles, so I took the opportunity of measuring a new base-line of 660 yards, and spent nearly two hours making observations; the barometer read 21.5; thermometer in shade, 44°. Having partaken of breakfast, we started along the ridge, descending gradually to the south-

ward. Now we saw that a glacier poured down into Beaver Creek to the east, and to the south-west another descended into the valley between us and the Dawson range. On reaching a point where the descent to this valley became more abrupt, I determined to leave the sledge here, while my cousin and I descended to explore the way ahead. Having arranged a signal which should mean that our companions should follow us down the slope with the sledge, we roped up and sped quickly downwards. The sledge soon became a dim speck, and then it was out of sight. Crevasses became more numerous, so we had to go cautiously. Threading our way through big *séracs*, in an hour from the time we left the sledge we reached a point whence we could see right down into the valley. In its bottom a fine glacier wound its sinuous course till lost to sight beyond a bend. Grand precipices flanked it on either hand, and piles of avalanche snow lay half covering the crevasses, which were in a regular network over its entire surface. Cautiously we crossed a few snow bridges, but it became too evident that this was no road for the sledge. Had we been by ourselves, and unencumbered, I feel certain we could have got down, if not through the ice-fall, at least by retracing our steps, making a detour of about a mile, and keeping close under the cliffs of the Dawson range. The glacier below was in the worst possible condition, just enough loose snow on its surface to make it into a whole series of pitfalls. So, after admiring the savage wildness of a scene on which I suppose our eyes were the first to look, we retraced our steps, and turned our backs on what I have called the Geikie Glacier, and our sledge was reached in due course after a weary plod up hill. As the day was passing, we had to turn our attention to finding some way of getting down to a camping ground. The two young men said they were parched with thirst and should get water, so leaving the sledge, and taking provisions for a meal, we set off to a rock peak overlooking Beaver Creek; here we melted snow on the hot rocks, ate our dinner, and inspected the great precipice from end to end. An enormous, heavy ice cornice overhung its entire length, from which avalanches fell into the valley below. The view over the Prairie Hills was exquisite, and to the Rockies, 60 miles distant, but we could find no way down; and as we did not see our way to camping in the snow, and no rock was available, there was nothing for it but to sledge back to Perly Rock, and try to reach it before dark. The sun had softened the surface, so that though the slope was in our favour it was a heavy pull, and only by a series of spurts at the end was I able to get all hands to pull together. Thunder was now growling, and before we could get our supper cooked a fierce storm broke upon us. We huddled into the tent, and so prevented it from being blown off into space; the silvery shafts of lightning blazed around, the rain came down in torrents, and the night we spent was not one of the pleasantest experiences of my life. The two young men said that they had had enough of it, and that nothing would

induce them to spend another night out. The descent to the hotel was made the next day in teeming rain. We had secured a fine set of photographs, sketches, and observations, and we had acquired a knowledge of the district which formed the foundation of all our future work.

The valley we had looked into was unknown. Mr. Hume, assistant manager of the hotel, who had made some excursions with Messrs. Topham in last spring, believed it must be the valley which opened at the Loop. To test the accuracy of that supposition was our next excursion. For the next three weeks Mr. Swanzy and I worked on without any help. During that time we proved that the Loop Valley was not the one we had looked into from the great snow-field. Next we ascended the glacier leading to what I have called the Asulkan Pass,* on account of the great number of wild goats we met with, and so reached the valley of the Geikie Glacier once more. Then by means of double packs we managed to convey our camp to the head of the Loop Valley.

From this camp, which was our headquarters for five days, we thoroughly explored the fine glaciers around Mount Bonney. We crossed two passes, and in a day of 18 hours' hard work, with plane-table and photographic apparatus packed on our shoulders, we made the ascent of the highest peak (10,622 feet). This involved an ascent from our camp, over wholly unknown ground, of 6500 feet.

After these expeditions we went by invitation to visit Mr. Corbin's mines at Illecellewaet, about 15 miles down the line to the westward. He kindly lent horses, and we rode up an excellent zigzag mule path over the mountain to the north of the line, crossing a pass 4000 feet above the track, and were able to take most important observations from an entirely new point of view of the group of mountains we had been working at.

Crossing the mountain range, we descended into the North Fork of the Illecellewaet river, and got views of the glacier sources of its streams. Two thousand feet below the pass we reached the mining camp; a single tent built on a little stage of pine logs, there being no level spot on which it could stand. The mines consisted of a few levels driven into the mountain side; heaps of rich argentiferous galena, in quartz, were built up at the entrance of the shafts.

On this excursion we were fortunate to fall in with Mr. B. Macord, known better as "Mountaineer Ben"; he had served when a lad on the United States Boundary Expedition, and in the Rocky Mountain Rangers during Riel's rebellion. We arranged with him to return with us to Glacier House, and we had his valuable aid in our expedition over the shoulder of Mount Macdonald with a pack horse to Beaver Creek (this was a desperate struggle through tangled forest, and fully demonstrated the difficulties of "packing" through the Selkirks. On three occasions the horse had the narrowest escape possible of being

* *Asulkan* is the Shushwap Indian name for the wild goat.

killed, and the poor beast had once to go for thirty-six hours on a stretch without food, except the few biscuits we could spare), and immediately after our return thence, in an excursion of four days' duration over the Asulkan Pass down into the unknown valley, and on to the Dawson Glacier.

The descent to the Geikie Glacier, down steep cliffs planed by snow slides, was not easy, but he proved himself to be quite equal to an average Swiss guide on the rocks, and knew so much about the trees and prospecting in general that he was a most agreeable companion.

It would be impossible, without trespassing too much on your time, to go into details of our journeys. So I shall try and give a more general sketch of the chief features of the range. I have marked the main line of watershed of the Selkirk range on my map, and reference to it will show that it runs through Mount Cheops, Roger's Pass, the Sir Donald range, and then cutting across the great Illecellewaet firn, continues its course along the peaks of the Dawson range. To the westward of this line there is a complexity of glacier-clad ranges, many peaks rising quite as high as those on the watershed; the valleys tending in a south-westerly course to the Columbia. To the eastward of the Divide, a great change comes over the aspect of the region. The Prairie Hills I have described above, and all the ranges between them and the Columbia, in its eastern portion, have a smooth rounded outline, forming a strong contrast to the ranges on the other side of the Divide. There seem to be no glaciers, the ranges not being high enough for their formation.

Among the higher ranges an immense number of small glaciers lie in the hollows, and two extensive snowfields are to be found within the limits of my map. One of these, being the source of the best known glacier in the whole region, on account of its being so clearly visible from the railway, I have called the great Illecellewaet firn, after the river of which it is the true source. This icefield, probably 500 feet thick, to the southward extends down into a valley as the Geikie Glacier, and to the eastward, having been joined by ice-streams coming from the Dawson range, it pours into Beaver Creek valley as the Deville Glacier. All these glaciers show evidence of shrinking. An immense moraine exists in the valley below the Illecellewaet Glacier, where in ancient times it was met by an extension of the Asulkan Glacier. Some of the blocks of quartzite in the moraine are of huge dimensions, one I measured being 50 feet long, 24 feet thick, and 33 feet high. Another isolated boulder farther down the valley, not far from the Glacier Hotel, measured 91 by 40 by 44 feet. The Illecellewaet Glacier descends abruptly into the valley resembling a little the Rhone Glacier; the ice is much broken, and it is too steep to walk on, so visitors have to rest content with exploring the ice cave, and looking at the beautiful clean ice, unpolluted by any morainic matter. The present snout of the

glacier looks as if it were advancing, for it has overturned some bushes near its north-eastern corner. This, however, may be only a lateral shifting of its course, but to test it I tarred a number of boulders along its lower edge, within a few inches of the ice, and trust that some tourists may be interested in examining these marks when a year has elapsed, and communicating the result of their observations.* One day, having obtained the loan of a large $1\frac{1}{2}$ inch auger, we ascended the south-western moraine, and, by cutting a number of steps with our axes, traversed a portion of the ice, and set up poles in a straight line for about one-third of the entire width of the glacier. The holes we bored were about 15-18 inches deep.

As we were away from our headquarters on distant expeditions, thirteen days elapsed before we were again able to examine the poles. In that time the ice had melted a vertical foot over its whole surface. The poles had fallen down, but owing to the peculiar shape of the auger holes we were able to find the true positions and set up the poles again. Observations showed that the pole nearest the moraine had moved 5 feet, the next one 7 feet, and so on, by calculation we estimated that the centre of the ice had moved along 20 feet in the thirteen days.

The Geikie Glacier, about 4 miles long and 1000 yards wide, is a much more interesting ice stream. Sheltered from the sun's rays by high cliffs, it flows along a level valley, so that one can walk across its lower portion in various directions without trouble. As it descends from the firn, it is much broken; then its surface becomes level, but with numerous transverse crevasses. Flowing round a bend, longitudinal fissures are set up, crossing the others, and forming such a multitude of *séracs* that the surface presents an appearance more like some basaltic formation with the columns pulled asunder than anything else I can think of. This beautiful structure gives place to the frozen waves of a *mer de glace*, and the glacier terminates in longitudinal and slightly radiating depressions and

STUTTER.

The lateral moraines are quite discernible down the sides of the valley for a considerable distance below the termination of the glacier. There is no medial moraine, and the Dawson Glacier, with medial moraines, just stops short of being a tributary.

The other great snow-field to which I have alluded above, the Van Horne Glacier, forms the source of the south-eastern fork of the main river of this valley. I was unable to visit it, and could only study it from a distance.

As the valley with this fine river, formed from the streams of numerous glaciers, has no doubt some name near its mouth, I have refrained from naming it till it has been further explored.

The week after we entered it for the first time, some prospectors

* I had some difficulty in getting the tar, and the bottle the superintendent of the line kindly sent to me from Donald was only sufficient to make thirteen marks in all.

entered it by ascending Flat Creek and crossing a low pass. I have heard that they called it Fish Creek, but as this name has been so frequently applied I do not wish to endorse it. From the summit of Mount Bonney I could see this river for about 20 miles of its course, and I incline to the belief that it finds its way to the Upper Arrow lake on the Columbia.

All the rivers in the Selkirks are rushing torrents, blocked in many cases by fallen logs. One lakelet alone occurred within the region of our wanderings, and as that is close to Glacier House, it will, when a path is cut to it, form an interesting excursion for tourists.

The level of perpetual snow in these mountains may be put down at about 7000 feet, and the upper limit of the forest at 6000 feet. Red snow, caused by the presence of *Protococcus nivalis*, is of frequent occurrence, and in July the surface layer was alive with myriads of little insects, so that when we wished to eat snow, we invariably scraped the surface off first.

The long continuance of settled weather was evidently the cause of the extraordinary development of the pitted and ridged appearance which I have been able to illustrate in many of our photographs.

Ere we left the Selkirks, the surface of the snow was everywhere discoloured by the soot from forest fires.

British Columbia and Washington territory stand unrivalled for the grandeur of their pine forests. The forests of the Selkirks consist principally of Douglas fir,* cedar,† spruce,‡ hemlock,§ and balsam.|| Roughly speaking, I have enumerated them with regard to elevation; the balsams, resembling our silver firs, as a rule, being nearest to the snow-line. They all attain huge dimensions, cedars eight feet in diameter being frequently met with, and they often grow so close together that I could not pass between their trunks. Fires have made havoc with these forests from time immemorial; lightning and spontaneous combustion, caused by friction, have no doubt done their work; the Indians are known to have burned the forests for the purpose of producing a good crop of berries on the undergrowth in the ensuing year. It is much to be feared that the fate of the most useful portion of these forests, that near the railway, is now sealed; for the destruction wrought by sparks from the engine, and by neglected camp-fires, is of too constant occurrence for even the wonderful recuperative powers of the vegetation in these regions to stand against it.

When the trees first catch fire, the flames run wildly through their tops and lighter branches. The smouldering away of the trunks is an after process, and often takes a long time. Sometimes the fires are extinguished by rain before this process is complete, so that in the midst of the living forest, numbers of gaunt charred trunks stand up as monu-

* *Pseudotsuga Douglasii*.

† *Thuja gigantea*.

‡ *Picea Alba and Engelmanni*.

§ *Tsuga Mertensiana*.

|| *Abies subalpina*.

ments of fires that occurred years ago. These rot slowly, and usually fall after heavy rains—there being never any wind in these valleys, except an occasional blast accompanying a thunderstorm.

Beneath the living trees thousands of prostrate trunks lie piled in every conceivable position, and in every stage of decay. These are to a certain extent over-grown by rhododendrons* and blueberry† bushes, and, in the damper parts of the forest, by the devil's club‡—a plant beautiful to look at, with large bright-green palmate leaves and tufts of coral-red berries, but whose thorns, if they penetrate the flesh, produce festering sores. Picture yourself, then, with a 40-pound pack on your back, creeping along a slippery, fallen trunk, fending off the devil's club with an ice axe, wriggling under fallen trees, or eight feet from the ground on the top of them, and you will have some idea of what travel in the Selkirks means. This kind of place is bad enough in daylight, but it is just a good degree worse at 10 p.m., and no moonlight. One day in a forest such as I have described my cousin and I gained a distance of one-and-a-half miles in seven hours' work. We had, however, double packs; when we had carried one pack on a little way we had to go back for the other.

One piece of advice I have for any one who may wish to penetrate these valleys, where no trail exists. Always be under way at daybreak, and stick to the river bed. You will probably make fair progress, but in the afternoon the river will be swollen by the melting snow, and then you will be forced into the forest. Whenever the forest has been smashed down by snow slides, and invariably at the head of every valley, the worst obstruction to travel of all exists, viz. the alder scrub.§ We would seek to avoid this at any cost, and make a wide detour to get into the tall timber rather than have to scramble through it. The alder stems, about two inches thick, form a dense jungle, and as they grow parallel to the ground, owing to having been pressed down by snow when young, you must continually keep scrambling over a selection of them, and at the same time bend low enough to get under the next branch above: not being able to get your foot to the ground, you slip on the branches, and, do what you can, often tumble over in a helpless manner.

Things are slightly better when your course is down a declivity parallel with the direction of the branches, for then you slide along gaily, checking your speed by hanging from the branches as they pass.

In many places one comes on a rank growth of the striking *Veratrum viride*, with its broad, succulent leaves, and when the boulders hidden by it are not very bad, there is a good lead so long as it lasts. Ferns are abundant. But what about the berries? All I can say is that such a profusion of palatable fruit I never met with. I have picked pine-

* *R. albiflorum*.

† *Vaccinium Myrtillus*, &c.

‡ *Fatsia horrida*.

§ *Alnus cirescens*.

apples on the margin of the Pitch Lake in Trinidad, and gathered many other fruits of the tropics, but give me what you can only get in the Rocky Mountains—a bowl of blueberries squashed with sugar, and what gives zest to the luxury, a hard day's work over, the fragrant smell of the cedar-wood camp fire, and the sun setting in golden splendour on a panorama of ice-clad peaks. Besides blueberries of two species, one better than the other, there are raspberries in profusion,* thimble berries, and black currants, which, by-the-way, grow on gooseberry bushes.

We pass from the forest regions to the heights above, "alps" we would call them in Switzerland. In the Selkirks, as yet, the brown chalets are missing, and our ear fails to catch the clang of the cow-bells, but the flowers are there in rich profusion. When in the high Alps of New Zealand, I had to acknowledge that the alpine flora was far inferior, in colour at least, to that of Switzerland. Not so in the Selkirks. Were it not that the blue star of the gentian is missing, I would say that we had more colour in America. The most conspicuous of these Alpine plants is *Castilleja miniata*; its scarlet blossoms giving a marvellous brightness to the mountain slopes, and to the older portions of the glacier moraines which were perfect gardens of flowers. The nearest approach to Edelweiss which we found is *Antennaria carpathica*. The highest point at which we met with Alpine plants was on the southern slopes of Ross Pass, 8500 feet above the sea. We made the ascent of this pass from the north, first up a glacier and then up a steep snow couloir overhung by a cornice. We seemed to be far above all vegetation, but on reaching the col, we found the slopes facing the south rich in Alpine flowers, *Dryas octopetala*, *Silene acaulis*, and *Haplopappus Brandegei* being the most abundant; below these slopes on either side of the pass lay the region of perpetual ice.

Professor Macoun of Ottawa has kindly named for me the plants I collected, and I should like much to linger on this subject, but must say a few words on the animals to be found in these regions. Bears of at least three species wander in the valleys of the Selkirks, the black, the cinnamon, and the silver-tip as the variety of grizzly is called. They are very numerous, almost every day we came upon their tracks; but they are so shy, and the cover is so dense, that we never got a shot at one. Mountain goats in the more unfrequented valleys are numerous, and so little used to man that on one occasion, when we were at breakfast, one of them walked right into our camp and stood inspecting us at five yards' distance; only for the red glow of the sun, rising through smoke of forest fires, I might have had his photograph. Cariboo are to be found in the lower ranges, but we never met any.

The heaps of boulders above the forest region form a refuge for a variety of animals—the hoary marmot, measuring about 3 feet long,

**Rubus villosus*, and other species.

being the commonest and most useful from a commissariat point of view. This creature gives a loud shrill whistle; so weird does it sound in these solitudes, that it returns to one's ears as an inseparable memory of the Selkirk valleys. The Sewellel is a strange beast; it too lives beneath the boulder heaps, and it has the most wonderful fancy for collecting flowers. One day when we were ascending a glacier moraine my cousin said to me, "Some one has been here before." I said, "Impossible!" but was utterly puzzled by finding a bouquet of flowers plucked, with their stems neatly together, just as though some child had laid them down. Soon afterwards we found similar bouquets at the burrows of these animals. What their particular object in collecting flowers is, it is difficult to understand: making hay for winter use I have seen suggested. Mountain rats, chipmunks, little chief hares, and other creatures are also common in these regions, rendering caches of provisions useless, unless tinned meats alone are hidden. My Alpine rope was nibbled up into little bits in one night, and on another occasion, some beast gnawed a hole through the tent while we were asleep, and ate the bread which I was using for a pillow. A skin I hung up to dry on the tent rope vanished, and the scampering of little feet up and down the outside of the tent, commenced every night the moment we retired to rest.

Birds are decidedly scarce; grouse of at least three species are the most frequent, and are an important help to the commissariat. The last animal I shall name is the mosquito. In July it was "a terror," in August it had vanished from the higher levels.

The geological structure of a range like the Selkirks is no easy study. I made a considerable number of notes on the subject, and Prof. Bonney kindly examined the rocks which I collected. But the foldings and contortions of the strata are so complicated that I can only state a few broad facts, which may prove some help to those who follow. I have already alluded to the glacial features of the country. Earlier than the formations of this period, we seem in the central range to meet with no rocks later than palæozoic. In the higher ranges greenish quartzites and micaceous schists are the commonest rocks. The summit of Mount Bonney and the southern and south-western arêtes of Sir Donald consist of a beautiful white, smooth, quartzite speckled in the former case, with deep brown spots, "probably iron or manganese oxides." Associated with these harder rocks are a number of remarkable silky-looking schists (*phylites* of Prof. Bonney), the result of great squeezing in the movements which upheaved the ranges. Roughly speaking then, the configuration of this district, with its complexity of valleys, is due to the disintegration and denudation of the softer schists and the permanence of the harder quartzites in mountain ridges. With regard to age, the rocks range from true Arohæan to late palæozoic, possibly a little later.

The older rocks within the area covered by my map occur in Mount MacDonald and the higher peaks to the southward. Newer rocks are found in the range from Ross Pass to the Illecillewaet Valley, also down low in the bed of the Dawson Glacier and the low ridge between the great Illecillewaet Glacier and the Asulkan Valley.

At Corbin's Pass we have moved further from the watershed, and about 2000 feet below the pass to the northward, a dark rock occurs with curious markings, which Prof. Bonney, and Mr. J. E. Marr consider to be caused by mineral deposits in what are probably the casts of Graptolites, and that probably the rock is of Ordovician (older Silurian) age.

The presence of very old schists and gneisses would seem, then, to show that though the range called the Rockies on the Canadian Pacific Railway route,* is the water parting, the Selkirks are geologically the true continuation of the Rocky Mountains of Montana, and the back bone of the continent.

The minerals occurring in many places through the Selkirks, have given rise to great hopes for the future of the country. We met with no gold, but we found in several places galena, which, in the Selkirks is often rich in silver. Traces of copper and iron ores were widespread.

With a few words on the climate I must conclude these notes. The fluctuations of the barometer at Glacier House never reached half an inch. The temperature at noon ranged from 50° to 85°. The average minimum temperature was about 40°, on one night only did it drop to 31°. On the peaks the wind was often strong, but in the valleys almost perpetual calm prevailed. The only wind experienced was the blast accompanying a thunderstorm, or the breeze caused by the descent of cool air from the snowy heights. This was very local; on the glaciers the downward blast was sometimes very strong, and the temperature low down on the glacier, lower than that at the summit, but at a little distance from the ice the breeze was scarcely felt, except in the evening, when it chilled the valley very quickly, after the sun had set. The southwest wind brought fine weather. Heavy rain came with the east wind. Rain fell on nine days out of forty, on which observations were recorded by Mr. Swanzy. Three days only were really wet. Snow fell once at heights above 9000 feet, and once there was hail; we experienced four heavy thunderstorms. The weather on the whole was superb, there being no clouds in the sky for periods of nine or ten days' duration. We were told, however, that the month of June had been very wet. In winter there is a very heavy snowfall in the Selkirks, but owing to the immense extent of shedding, the trains run with great regularity all the year round. In February the "Chinook" winds begin to blow, resembling in many respects the Föhn winds of Switzerland and the hot

* "The ancient crystalline rocks form no part of this portion of the Rocky Mountains." ('Geological Survey of Canada,' preliminary report Rocky Mountains, p. 20n.).

winds of the Canterbury Plains in New Zealand; the snow melts quickly under their influence, and great snow slides take place.

But having wandered beyond the limits of my own experiences, I must bring these notes to a close, and hope they may be of use to those who will visit this region of rushing streams, towering forests, rugged peaks, and fine glaciers, all of which combine to make it one of the most lovely districts on the surface of our planet.

After the paper,

SIR CHARLES TUPPER said he was extremely glad to be able to add a few words to the very interesting and instructive lecture. In passing over the line of the Canadian Pacific Railway he saw scenery which was unsurpassed in any part of the world. Of course he had but a very slight knowledge of the very interesting section of the range which Mr. Green had described, and at his time of life, and considering the obvious perils attending the attempt, he would have to be contented with the very vivid description given in the paper, and could not hope ever to see the places which had been passed over with so much courage, zeal, intelligence, and knowledge of the subject by Mr. Green. He quite coincided in the opinion that the journey over the Canadian Pacific Railway far surpassed in interest that over either the Northern Pacific or the Union and Central Pacific. He had travelled over all three. The Great Humboldt Desert was in the form of a V, with the apex to the north. In passing over the Union and Central the traveller passed the base of the desert, which was of a very uninteresting character. The Northern Pacific line passed across the cone at a much higher elevation, but a very considerable portion of the country was bleak and desolate. The Canadian Pacific avoided that, because the line was beyond the apex of the cone; and it would be difficult to imagine scenery of a more interesting character than was met with from the time the railway entered the Kicking Horse Pass to the terminus at the Pacific Ocean. He had no doubt that thorough investigation of that section would result in the discovery, not only of the rich silver-mines of which the lecturer had seen something, but also of gold-mines and other valuable minerals.

Captain WHARTON, R.N. (Hydrographer to the Admiralty), said he was in the Rocky Mountains last year, and met Mr. Green at the Glacier House. His stay there was very short, but he saw enough to enable him to appreciate the great value of the work Mr. Green had done. That portion of the Rocky Mountains was almost unknown, and quite unmapped. It was true that the Canadian Pacific Railway traversed it at one part, but the mass of the mountains had never been mapped or visited by any human beings. He believed that the Indians never penetrated into the Selkirks. Botanists and geologists had great cause to thank Mr. Green for the excellent map he had produced. There was a terrible destruction of the forests going on. The traveller often saw columns of smoke which obliterated the landscape. In his own short trip across he saw two forests of magnificent timber, worth any amount of money, in full blaze; and he believed that was unpreventible. Sometimes the fires were caused by cinders from the engines, and at other times by men, prospectors of minerals and others, carelessly leaving pipes alight; and when once those resinous trees caught fire, they burned with extraordinary fury, eating the roots of the trees out, and thereby loosening the soil. The mountains were extremely steep, so that the soil was easily washed off when unprotected by vegetation, and it was very doubtful whether the forests so destroyed would ever again flourish, and any one who wanted to see the Canadian Pacific line in its glory should go there very shortly, because a great deal of its beauty would soon be spoiled.

Mr. TOPHAM said he visited the Selkirks last spring, and again in the autumn, and he could bear his testimony to the great accuracy of Mr. Green's sketches. Few places that he had ever visited were more beautiful than the Selkirks, and he hoped to go there again. He went out there with the intention of climbing Mount Sir Donald, but did not succeed. In the spring he could not, and in the autumn his party was not sufficiently strong to attempt it. He agreed with the last speaker that if anybody wanted to see the Selkirks, the sooner he went the better. The scenery was suffering already from the forest fires, caused partly by the railway, partly by the carelessness of travelling parties.

Mr. FRESHFIELD said that Professor Bonney and Mr. Dent, the President of the Alpine Club, had hoped to have been present at the meeting, but both were unavoidably prevented. Mr. Green had hardly done full justice to his scientific work. Several of the valleys that he had mapped out had never before been shown on any map, and Mr. Green had, he thought, often resisted going to the tops of peaks in order that he might get to more places where he could take his plane-table. Special thanks were due to any traveller who brought home such admirable photographic illustrations. Mr. Green's pictures gave a very good impression of the scenery of the Selkirk Mountains, which seemed to resemble that of the Tyrol. The glaciers were about on the same scale as those in the Central Tyrol, the peaks being, as there, steep relatively to the valleys, but stumpy relatively to the glacier basins. We sometimes heard a good deal of the "big things" in the United States. The other day he had had a series of photographs of the glaciers there sent him, and he was glad to find, in glaciers at least, the States were far behind Switzerland. Compared with those of the Alps, the icefields figured were as Primrose Hill is to Mont Blanc. He had, therefore, he confessed, on hearing Mr. Green's account, felt a momentary apprehension lest the tempting description of the Selkirk glaciers should lead the Americans to wish to annex a range so well provided with a commodity they are poor in. But he was glad to be reminded that within their own territories, if not in the States, the Americans now possess noble glaciers, for Mr. Topham would shortly report to the Society that in Alaska he had found glaciers which, if not the most extensive in the world, were certainly far greater than any in Europe, and the most accessible of their size.

A vote of thanks to Mr. Green concluded the meeting.

GEOGRAPHICAL NOTES.

The Exploration of the Upper Salwin and Lu Rivers.—Lieut. Vans Agnew has undertaken a journey to the Upper Salwin and South-eastern Tibet, with the object of attempting the solution of the problem of the course of the Lu river—whether to the Irawadi or to the Salwin—propounded by General J. T. Walker in his paper read to the Society on the 25th April, 1887. The Council of the Society has sanctioned a contribution of 100*l.* towards the expenses of this expedition. Lieut. Vans Agnew leaves India for the Salwin in the course of the present month.

The Russian Expedition to Thibet.—It is announced that the expedition, which under the leadership of General Prejevalsky was on its way to Thibet when it was brought to a stand by the untimely death of the leader in November last, is not to be abandoned. A fresh start is to

be made some time during the present month (March), when Colonel Pievtzov, known to geographers through his travels in Mongolia, will assume the command of the expedition. M. Bogdanovitch, a mining engineer, will be attached to the mission as geologist.

Explorations in the Pamir.—The eastern part of the Pamir was explored in 1887 by the traveller Grum-Grshimailo, to whose previous journeys in that region we have before referred. His route upon the present journey was as follows:—Starting from the river Kudar in the north of the Pamir he skirted Lake Rang-kul, crossed Tash-kurgan, and proceeded along the upper course of the Yarkand-daria, across the Mustagh and the spurs of the Kara-korum range and the Benku Pass to Ak-su. It was then his intention to visit Wakhan, but finding that impossible, he effected his return northwards by the most direct route. His surveys extended over several hundred miles of country, and his map forms a valuable addition to the cartography of that region. He was able to determine more than twenty new altitudes, besides correcting many former determinations. Among the other important geographical results of his journey may be mentioned the discovery and partial exploration of certain glaciers on the upper course of the river Tagarna, and the delineation of the western part of the Kara-korum mountain system.

Further News of Grombchevski's Expedition across the Pamir.—We are indebted to M. Venukoff for further interesting details regarding Captain Grombchevski's journey, in continuation of his communication published in our February No. (p. 103). They are taken from a letter of the traveller to M. Venukoff, and are as follows:—“From the outposts of the Alai I proceeded, on July 23rd (1888), up the Isfairam river, crossed the pass Tenghiz-bai, and followed the valley of the Great Alai. At the entrance into the gorges of Kyzyl-art we stopped for two days, in order to buy horses accustomed to mountain journeys, and then resumed our march, *viâ* the pass Kyzyl-art, towards the depression of Lake Great Kara-kul. We crossed further the pass Ak-baital, and soon reached the Ak-su, or Murghab. According to the plan of my journey, I had now to cross the mountains which separate the Ak-su from the Pamir Tagdum-bash, and try to penetrate into Kanjut so as not to touch Afghan territory. I could do so if I proceeded nearly due south from Ak-tash, across the Benku Pass, because this route would bring me to a place situated some thirteen miles higher up than Kurgan-i-hojar-bai; but I learned that in such case I should fall amidst the summer encampments of the local *beg*—a Kalmuck, devoted to the Chinese—who would not allow me to proceed further. I should have to resort to force, and thus have too many people hostile to me. Therefore I decided to enter the Khanate of Wakhan, presuming that the Afghans cannot be nearer than at Kala-i-pianj, and that I thus might cross the Kelinj Pass, and enter Kanjut before the Afghans had time to come and stand in my way.

So I went up the Ak-su, reached its sources, crossed the Chil-ob, or Andemanyyn Pass, and came to the upper parts of the Vakhn-daria. On August 15th we encamped at Bazai-i-gumbez, opposite the mouth of the Vakhjir (or Almayan-saya). Up to this time we had marched without taking one single day's rest, and had covered nearly 400 miles. The horses behaved very well, notwithstanding the high altitude of the region; but each of them was carrying about 360 pounds of luggage, and they badly wanted some rest. However, we learned from some Vakhn travellers that there was no time to lose; a strong Afghan detachment was camping at the Sarkhyad village, and a longer stay at Bazai-i-gumbez would not be advisable. I also had to abandon my scheme of taking the Kelinj Pass, and I entered a lofty mountain tract towards the sources of the Dangnyn-bash river—the Kara-tchukur—with the intention of entering later on the valley of the Kalik stream, which would bring me to the Kalik Pass, and thence to Kanjut. By taking this last route I should avoid an encounter with both the Afghans and the beg who was staying much lower down the course of the Kara-tchukur. In the meantime, the weather, which so far had favoured us, suddenly changed. Rain was pouring, and after two days it turned into snow. The last traces of the foot-path which we were following had disappeared under the snow, and I was compelled to stop. However, the snowfall, while retaining us, had also retained the Afghan detachment which had been sent out from Wakhan in order to seize us. The informers only of the detachment had succeeded in following us, and we took them prisoners. Under the menace of being shot, these two men showed me the way across the Vakhjir Pass to the Kara-tchukur river. The pass, nearly 13,800 feet high, was covered with snow, and a snowstorm raged as we crossed it on August 21st. To avoid being stopped by the Chinese begs, I entered next day the gorge of the Kalik river, and, without guides, we were searching for three days a passage amidst the glaciers and the perennial snow of the Mus-tagh. Finally we found it, and the passage proved exceedingly easy; in fact, a cart with a full team of horses could follow this route. —When we reached the summit of the pass, I saw under my feet the gorge of Kanjut; my dream for many years past of seeing the southern slope of the Hindu-kush thus became a reality. I had no idea what would be my reception there; should I return alive? I rejoiced to see that my supposition as to the easiness of the passages across the Western Himalayas, or the Eastern Hindu-kush, was so fully confirmed. We had journeyed with heavy luggage, covering no less than twenty, and sometimes more than thirty miles every day, and now we stood at the gates of Kanjut without having lost, or even injured our horses. After descending into the valley of Kanjut, we marched almost without hindrance to Lub-jangan, where we met with the first inhabitants of Kanjut. The people we met with had been sent out by

the ruler of the country, Safder-ali-khan, to levy taxes from the Pamir Kirghizes submitted to China. I learned from them that a further advance with laden horses would be impossible, and so I wrote to the khan announcing my arrival in his territory, and asking him to send bearers for the transport of my luggage. The answer came seven days later and was favourable, the khan was sending me men and expected me in his capital.—From our first steps we discovered that the road was really impracticable for horses. Even I—an experienced hunter in the Turkistan mountains—was stopping quite bewildered, and at certain dangerous passages I was bound to resort to the help of the mountaineers. The khan received me with suspicion to begin with; but later on he made me an excellent reception, at a *darbar* to which all the higher functionaries and elders of the khanate, as well as envoys from Nagar and Ghilghit, were invited. I entered the circle of the functionaries on horseback—the khan's music playing and salutation shots being fired from a gun and the *taifurs*.—Next day the khan came to dine with me, and during the visit he took a cold and fell ill with fever. He suspected me of having poisoned him, and so I had to doctor him and stay, although I surely would have been torn to pieces if the illness had had a fatal issue. But I armed myself with calmness and a bold persuasion that nobody would dare to offend a Russian, and this policy proved the best. Finally the khan recovered. At the same time the news came of an insurrection which had broken out in Afghanistan, and of cholera having made its appearance in Ghilghit. A war was beginning against the Kashmiris who were gathered around Ghilghit. I had nothing more to do in Kanjut, and so I bade farewell to the khan at a special audience on September 19th, and on October 2nd I was again on the Pamir Dangnyn-bash, after having crossed the pass Ming-teke.—In order to characterise the inhabitants of Kanjut, it is sufficient to mention the two following facts:—Safder-ali-khan has shot his own father, poisoned his mother, stabbed to death his brother Sha-sumeis-khan, and ordered to be thrown over a precipice his two younger brothers, one of whom was eleven years and the other eight years old. The other fact is this:—Kanjut was visited before me by Colonel Lockhart, who kept the brother of the khan and the son of the vizier as hostages, and nevertheless part of his numerous escort were taken prisoners by the Kanjutis and sold into slavery. Altogether, they live upon robbery, plundering both the Chinese and the Kashmiris and selling their prisoners into slavery. Kashmir pays them every year 15,000 rupees, and China sends substantial presents to induce them to keep quiet, but nevertheless they continue to practise their old customs of rapine and robbery. If I have succeeded in twice crossing their country without having been robbed, it was probably on account of the friendship of the khan and his favourites, besides, and my own boldness. I never asked anybody's permission to make my survey; I determined latitudes and longitudes,

and observed my meteorological instruments at regular hours, without trying to conceal one. The Kanjutis, no doubt, felt that, in case of need, I should fight desperately, and, being themselves endowed with boundless courage, they respected the feeling of security which I displayed while living among them. When I reached the Pamir Dangnynbash, I had lost half my horses, and the other half were out of service. I was compelled to leave there my men and luggage while I went with one man only on hired horses to Ruskem. I proposed to explore the Ruskem river up to Karakorum and thus to connect my survey with that of the British. But we soon learned that the Kanjutis had plundered a rich caravan which was marching from Yarkand to Ladak, and had also kidnapped the whole of the scanty population of Ruskem; the land was now a desert. My guide, who was afraid of also being taken prisoner by the Kanjutis, and wanted to compel me to return, managed to drown all the sheep I had taken with us for our food as we were crossing the Raskem-daria. So I was compelled to return. However, this unsuccessful excursion—which brought me within three days' march of Kirghiz-ilga (a spot marked on British maps)—had the advantage of permitting me to correct the map of the Raskem river and its sources.—Returning to Dangnyn-bash, I took over my oxen and we followed the course of the Tash-kurgan river, past Tash-kurgan, as far as the peak Tagarma. I followed the course of the Tash-kurgan river, past the villages of Shindi and Baldyr, and thence went up the valley of the Vatcha. My intention was to reach the middle course of the Ruskem river, and to survey it in a tract which had not yet been explored. At Pehan-yart I was compelled again to leave my men and horses, which were broken by fatigue, and again accompanied by one man only, I went on hired horses to Pil, on the Ruskem-daria; but we nearly succumbed during that excursion from want of water. Returning again by the same route, I rejoined my men, and we went up the Shindi river, past Chichiklik and Koahka-su, to the sources of the Ring-kul, and thence down its valley as far as Ighiz-yar. There I turned towards the north, crossed the ridge which separated me from the Kara-tash, and went up this last river across the mountains which M. Ivanoff has named the Kashgar ridge; we passed between two peaks of the Mustaghata, over the very high pass Kara-tash, and reached Lake Little Karakul. The valley of the Ghez river, past Upal, brought us to Kashgar."—Since this letter was received, General Venukoff informs us that Grombehevski had returned to St. Petersburg, where the Russian Geographical Society awarded him a gold medal, and he was received by the Emperor. The detailed report of the expedition is expected to be published next autumn.

Russian Colonies in the Syr-Daria Region.—The Russian colonisation of Central Asia began in 1875 in the Syr-Daria region, on the east of Lake Aral, by the foundation of the village of Mikhailovsk in the district of

Aul-Izatine. Progress was slow; in 1880 there were not more than 200 Russians in the colony; it was only in 1884 that things began to improve. In the following year there were eight Russian villages on the Syr-Daria and four others inhabited by German Mennonites, in all 550 souls. Last year six other Russian villages, comprising 324 families, were formed, extending over two neighbouring districts. In other parts of the Syr-Daria region, colonisation progresses at an equal rate.

Mr. Grenfell's Map of the Congo.—We have been favoured by the Rev. G. Grenfell with the original drawing of his detailed chart of the Congo and the Kwango, commencing with Stanley Pool and ending with the Kingunji Falls of the Kwango. The chart is in twenty-two sheets and is drawn from his own surveys, on the scale of one geographical mile to the inch. The distance surveyed is 360 geographical miles. For the present, this admirable contribution to our topographical knowledge of the Congo basin, the latest of the numerous works of a similar kind for which we are indebted to Mr. Grenfell's zeal and ability, is deposited in the Map Collection of the Society.

Chitambo of Ilala and Livingstone.—In consequence of the statement of Mr. Arnot at our meeting of the 7th January to the effect that Chitambo, the chief of the Ilala country where Livingstone died, was dissatisfied at not receiving some recompense for permitting the removal of the great traveller's body and personal belongings, our Council has decided to place at Mr. Arnot's disposal the sum of 50*l.*, to be applied to the purchase and conveyance of a suitable present to the chief. Mr. Arnot has accepted the commission, and will see that it is carried out on his return to Central Africa, for which his preparations are now nearly completed.

Dr. Colin's Survey Work in Bambuk (Senegambia).—The district of Bambuk, situated between the rivers Faleme and Bafing, which unite near Bakel to form the river Senegal, was surveyed last year by Dr. Colin, who has communicated to the Geographical Society of Paris the results of his operations. Dr. Colin's instructions from the French Government were principally to prepare a map on the scale of 1:250,000 of that portion of the south Bambuk and north Futa-Djallon, which lies between Kegneko to the north-west, Irimalo (on the Faleme) to the south-west, Sendinian to the north-east, and Bendugu (on the Bafing) to the south-east. Dr. Colin, making Kassama his starting-point, occupied about six weeks (April and May) in surveying a circular route of 250 miles. His work, together with the surveys of other French officers, viz. MM. Plat, Vitu and Kerraui, &c., effected about the same time in neighbouring districts, has definitely fixed the topography of this country and caused important modifications in former maps. The upper course of the Faleme, for example, is entirely changed. Instead of continuing in a direct line to Labe in Futa-Djallon, it bifurcates between Satadugu

to the north and Irimalo to the south, into two branches of almost equal importance. The western arm is called the Bá-lin-ko, while the eastern arm preserves the name of the Faleme; the latter flows almost due east. Irimalo is therefore situated on the Bá-lin-ko and not on the Faleme. To the south-east of Irimalo lies Wontofa (Falea), in the neighbourhood of which caoutchouc trees abound. It is wrongly placed on Plat's map at the foot of the mountain; it is in reality situated at an altitude of over 1600 feet upon a vast ferruginous plateau, covered with prairies and gently-sloping wooded hills. Dr. Colin had intended to penetrate eastwards from Wontofa to the Bafing, but his porters refused to accompany him across this trackless country; he therefore turned to the north-east, and worked his way back to Kassama through Konkadugu.

Captain Binger's journey in the Upper Niger Region.—Tidings of Captain Binger, who for the last two years has been travelling in the country comprised within the great bend of the Niger, and a report of whose death by treachery was circulated some months ago, have been received by the Geographical Society of Paris, in a letter from M. A. d'Albécq, Governor of Great Popo. Captain Binger started from St. Louis in March 1887, and reached Kong (Western Sudan) just one year later, having visited Kayes, Bammako, Signiri, and the states of Samory and Tengrera. From Kong he paid a visit to Mosi, and on his return from the latter place to Salaga he fell in with a native courier, who had been despatched by M. Albécq to try and find the traveller in the vicinity of Kong. According to a letter written on 11th November last from Salaga, Captain Binger intended to start on the following day on his journey to the coast, which he hoped to reach at the end of March, travelling by way of Kong. He gives no details as to his journeys, the results of which cannot fail to increase our knowledge of the imperfectly known regions visited by the traveller. Meanwhile the relief expedition under M. Freich-Laplène, which left Assinie on 9th September in search of Captain Binger, had according to the latest advices reached Bonduku, the capital of Gyaman, at the end of October, and was preparing to start for Kong.

The Population of Morocco.—From a new investigation as to the population of Morocco, published in the *Réveil du Maroc*, we obtain the following results. First, as to races:—Berbers and Tuaregs, 3,000,000; Shella Berbers, 2,200,000; Arabs (1) pure Nomadic Bedouins, 700,000; (2) Mixed, 3,000,000; Jews, 150,000; Negroes, 200,000: total, 9,250,000. As to regions, the population is distributed as follows:—

The region of the old kingdom of Fez	3,200,000
Ditto of Morocco	3,900,000
Ditto of Tafilet and the Segelmesa country	850,000
Ditto of Sus, Adrar, and the Northern Draa	1,450,000
Total	9,400,000

The difference of 150,000 between the two estimates is ascribed to the difficulty of obtaining precise estimates in a country like Morocco. This estimate considerably exceeds all previous ones. Dr. Rohlf, in 1883, placed the population as low as 2,500,000; while other estimates make it 8,000,000. That generally accepted hitherto has been 5,000,000.

Fresh Explorations in German New Guinea.—Dr. H. Zöller, known to geographers in connection with his explorations in Togo Land (West Africa) has accomplished an important piece of pioneer work in the interior of the German Protectorate of New Guinea. Accompanied by three officers, he started from the coast at Constantine Harbour in November last, and spent four weeks in the interior. At present but little is known of the results of his journey, as the details have not yet been published, but it appears that the party ascended the Finisterre range of mountains up to an altitude of 9000 feet, at which point Mount Gladstone still rose another 1000 feet above them. A new chain of mountains, lying between the Finisterre and Bismarck ranges, and rising to a height of about 10,000 feet, was discovered, and named the Krätke range, after the Governor-General of the district. Altogether about 140 miles of country were surveyed. A considerable advance has thus been made towards the exploration of the unknown interior.

A proposed Norwegian Arctic Expedition.—It is stated that a movement has been started in Norway for the despatch in the summer of 1890 of an expedition which will try to reach the North Pole, and it is proposed to offer the leadership to Dr. Nansen who will probably return from Greenland in a few weeks. The intention is that an attempt should be made to reach the pole by way of Franz-Josef Land—a route which is advocated by some of the most competent authorities on Arctic explorations. *Ski*, which have played so prominent a part in the Nordenskjöld and Nansen Greenland expedition, would no doubt again prove of service.

Antarctic Exploration.—A scheme is on foot for the furtherance of Antarctic exploration by private enterprise. A New Zealand colonist (a Norwegian) has come to Europe for the purpose of taking out with him a number of Norwegians who have been accustomed to fishing. In one or two steamers, the gentleman referred to intends to send out these Norwegians, under proper command, accompanied by one or more scientific men, with suitable equipment, for the purpose of exploring the Antarctic region, with the ultimate object of establishing a whale fishery on an extensive scale. If at all practicable, a party will be left during a whole year on Victoria Land, or other suitable place, in order that the conditions of the region may be thoroughly investigated.

The Population of Switzerland.—According to the preliminary results of the census of Switzerland, which was taken on the 1st December, 1888, the total population at that date was 2,934,055, as compared with

2,846,102 in 1880. This increase of 87,953 in eight years shows a considerable diminution of the rate of increase of previous periods. This is ascribed solely to the excessive emigration during these eight years; 70,000 Swiss having left for countries outside Europe during that period. If those who have left to settle in European countries be included, the total number of Swiss who have left the country during the period amounts to over 160,000. As in other European countries, the growth of the town population has been much greater than that of the country. For the period between 1850 and 1888, the former has increased at the rate of 122 per cent., and the population generally only 27 per cent.

The Cañon of the Tarn in South Central France.—We read in the new edition of Murray's 'Handbook of France' (1888), the following interesting description of a region of cañons in Central France, access to which has only recently been made practicable by the opening of a new line of railway. The region is that of Les Causses, a tableland rising 3000 feet and upwards above the sea-level in the Departments of La Lozère and Aveyron. The upper surface of this high plateau presents nothing but nude dry rocks entirely destitute of water, standing or running, but its striking and peculiar feature is the number of deep ravines which traverse it, with vertical sides, 400 to 600 metres deep. The chief of these gorges is that of the Tarn, which runs through it at the bottom of a cañon, resembling those of the Colorado, but on a smaller scale. The Tarnon, the Jonte, the Dourbie, and the Fraissinet also pass through cañons, which fissure it in various directions. The cañon of the Tarn, however, has a length of 31 miles, during the whole of which, not a single streamlet or torrent enters, but it is fed by twenty-five to thirty voluminous fountains gushing out at the foot of the high cliffs which bound it, those on the right or north being the escarpment of the Causse Méjean, on the left, and the Causse Sauveterre on the right. Where the Tarn enters the gorge it is an insignificant stream, nearly dried up during four or five months of the year. At its outlet it is a large, copious, and never failing river. The cause of this phenomenon is thus explained. Every drop of rain which falls upon the surface of the Causses above, sinks at once into the ground, and filters through the pervious strata of jurassic limestone, until arrested by the subjacent beds of the lias at the level of the bed of the Tarn. The grandeur and picturesqueness of these deep and narrow gorges is augmented and varied by the singular character of the dolomite rocks which crown the precipitous walls.

International Congress of Geography at Paris.—We have received a later circular from the Commissioners, giving further details as to the objects and organisation of the approaching Congress. The meetings will be held in the rooms of the Geographical Society of Paris, 184, Boulevard St. Germain, from the 5th to the 11th August, 1889; one

general meeting being arranged to take place at the Exhibition in the Salle du Trocadero. As usual in assemblies of this nature, the subjects to be discussed will be classed in Sections, which will be seven in number, dealing respectively with Mathematical, Physical, Economic, Historical, and Educational Geography, and Voyages and Explorations. A novel feature of the Congress is that each Society invited is asked to furnish a Report on the progress during the century of the Geographical Sciences in the country it represents; the Report is to be in two parts, one consisting of a narrative of explorations and discoveries, the second to be a bibliographical index of the principal publications on the subject.

Geography in the French Government Services.—Some time ago a geographical department was established in connection with the French Army, and quite recently a similar department has been attached to the French Ministry of Marine and the Colonies. The business of the latter is, (1) To collect and classify maps relating to the French colonies; (2) To publish new maps, and particularly maps showing the results of treaties; (3) To collect and classify geographical documents illustrating treaties concluded with native states.

On the Substitution of Hypso-thermometers for Mercurial Barometers.—Russian geographers and physicists have been experimenting with hypso-thermometers with a view to ascertaining whether they may be safely substituted for mercurial barometers, which are so very liable to be broken in transport from place to place. M. Savellieff has published in the 'Memoirs of the Russian Geographical Society,' vol. xviii. fasc. 1, a description of a hypso-thermometer which was constructed for him of hard glass by M. Baudin of Paris; and he has come to the conclusion that a good thermometer, appropriately graduated for precise readings at the boiling-point, and properly boiled, may be relied on to give results which, for hypsometrical purposes, are practically as good as those derivable from mercurial barometers, provided the index error of the thermometer is determined from time to time by plunging the bulb into melting ice.

Erratum.—In our last number (February), p. 100, a degree mark was by error substituted for a query after the mercurial barometer readings forwarded by Baron Ungern Sternberg. There is an obvious error in these readings as given in "English inches," which Baron Ungern Sternberg will doubtless furnish the correction of.

REPORT OF THE EVENING MEETINGS, SESSION 1888-9.

Fifth Meeting, 28th January, 1889.

General R. STRACHEY, R.E., F.R.S., President, in the Chair.

ELECTIONS.—*F. Faithfull Begg, Esq.; F. Sparkes Norman Bingley, Esq.; Henry D. Bishop, Esq.; William Blanchard, Esq.; George William Brangwin, Esq.; John D. Cobbold, Esq., J.P.; Commander Henry Davidson; Fred. Hare, Esq.; Hon. Philip King; Capt. Reginald Adams Marriott, R.M.A.; John Stapleton Martin, Esq.; Rev. Philip Read, M.A.; Commander Charles Edward Reade, R.N.; Dr. Ernest J. Schuster.*

The paper read was:—

"The Gran Chaco (Argentine Republic) and its Rivers." By Captain John Page, Argentine Navy.

Vide ante, p. 129.

Sixth Meeting, 11th February, 1889.

General Sir C. P. BEAUCHAMP WALKER, K.C.B., Vice-President,
in the Chair.

PRESENTATION.—*Edmund Hannay Watts, Esq.*

ELECTIONS.—*William Henry Allen, Esq.; William Manning Allport, Esq.; Allan Leathley Armitage, Esq., M.A.; John C. Bell, Esq.; Sir Benjamin V. S. Brodie, Bart.; Lieut. Claud Cass; Vice-Adm. Jno. Halliday Cave, C.B.; Rev. Edw. Edney Cleal; George Hunter, Esq.; Capt. Heinrich Gottfried Langen; Edwin Liot, Esq.; Major Arthur Purvis Loyd (21st Hussars); Captain C. M. Macdonald (Highland Light Infantry); George Reed, Esq.; George Royle, Esq.; Edwin Topham, Esq., B.A.*

The paper read was:—

"Explorations in the Glacier Regions of the Selkirk Range, British Columbia, in 1888." By the Rev. W. Spotswood Green, M.A.

Vide ante, p. 153.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—January 4th, 1889: Dr. HAMY in the Chair. The Marquis de Croizier, President of the Indo-Chinese Academic Society, announced his return from his journey to Central Asia, in the course of which he had traversed the valley of the Amu-Daria, the Khanate of Bokhara, and the Turkoman country as far as the Chinese frontier. He had been able to make a very interesting ethnographical collection, a portion of which he had sent to the Minister of Public Instruction.—M. Venukoff communicated the following geographical news. M. Grombchevsky, the explorer of the Pamir, had completed his journey from Margilan to Hunza, and was daily expected to arrive in St. Petersburg. Several eminent specialists were continuing the publication of the scientific results of the explorations of Prejevalsky and Potanin in Central Asia. Thus M. Paul Venukoff had recently published two memoirs, one on the basaltic rocks of Mongolia, the other upon the carboniferous deposits in the south of the same country. The basalts had been found by the Russian travellers in the region of Orkhon (48° 50' N. lat.),

in the chain of the Abtzykh-Khairkhan (48°), on the borders of Tui ($46^{\circ} 10'$), at the foot of Mount Ubiu ($45^{\circ} 30'$), and in the environs of the village of Si-kheuning ($40^{\circ} 40'$), thus proving that they abound in countries where volcanic phenomena were unknown in our days. The basalts were interesting by reason of their position on the summits of hills where their basaltic strata formed plateaus, separated from each other by deep ravines. The carboniferous limestone was found in South Mongolia, under latitude 39° , on the banks of the river Bardun. From the character of the fossils these rocks appeared to belong to the most ancient deposits of the carboniferous period. M. Vocikoff, the eminent traveller and physical geographer, had published the results of some important researches on the temperature of the waters of lakes and rivers, the principal aim of which was to determine the "thermic balance" existing between the annual, monthly, &c., temperatures of the water and the atmosphere. These researches demonstrate that the annual amplitudes are greater in the water than in the air, while the daily amplitudes are ordinarily greater in the air than in the water. Another paper by M. Vocikoff was devoted to the influence of the configurations of the soil upon the mean temperatures, and a third memoir dealt with the still unsolved problem of the influence of vegetation upon the fall of rain and snow. In the latter paper would be found the results of the observations made by M. Skalon in the district of Kharkov, with nine rain-gauges. These observations supported the theory that the immediate proximity of waters and forests increased the quantity of rain in summer. M. Tillo had calculated the altitude of Mount Aïruk, the chief summit of the Mugoljars, which form part of the Southern Urala. Its height was 1890 feet, not 1000 feet, as supposed.—Count de Bizemont gave some further information relative to the International Congress of Geographers to be held at Paris in the summer, and announced that the meetings would begin on the 6th August and continue till the 10th.—In conclusion, Dr. Chervin read an interesting paper upon the economical and geographical conditions of the development of French population. Comparing the census of 1886 with that of 1881, there was an increase for the five years of only 1.5 per cent.; during that time the population in 32 departments had decreased. A comparison of the census of 1872 with that of 1886 showed that there had been an increase of population in 39, and a decrease in 13 departments. Those which exhibited an increase were (1) the departments with great urban centres, (2) those where the economic conditions had created industrial centres, i.e. Pas-de-Calais, Aude, Haute-Vienne, Loire, &c. The great centres of the grouping and development of the population were to be found along the rivers.

January 18th, 1889: M. MILNE-EDWARDS, of the Institute, in the Chair.—The Chairman announced that the Bureau of the Central Commission had been constituted for the year 1889 as follows:—President, M. Milne-Edwards, of the Institute; Vice-Presidents, M. de Bizemont and Admiral Vignes; General Secretary, M. Charles Maunoir; Assistant-Secretary, M. Jules Girard.—M. Milne-Edwards, in his opening address as President of the Central Commission, referred to the loss which the Society had sustained in the past year by the death of General Perrier, and gave a *résumé* of the valuable geodetical work accomplished by him.—M. G. Marcel, of the National Library, communicated some extracts from a letter received by him from M. de la Martinière, who is pursuing archaeological researches in Morocco. The letter was written from Tangiers on 5th January, and stated that the writer had, among other things, discovered Gutiana (?), or at any rate the site of a Roman city along the route from Volubilis to the Sala Colonia. This city, of which the walls alone remain, was situated in a bend of the river Ued-Beh't, an affluent of the left bank of the Seba. He had also found the site of another Roman settlement in the great plain of the Seba, three hours' march to the north of

Gutiana (?). From the summit of Zerhun, near Fas, he had carefully surveyed the mountainous region around, and had discovered a citadel belonging either to the Byzantine period or to the transition period between the arrival of the Vandals and the Arab occupation.—A letter from M. Jules Borelli, now travelling in South Ethiopia, was read by M. Antoine d'Abbadie, of the Institute. The letter enclosed a map of the little-known country between 2° and 10° N. lat. and 33° and 37° E. long., which M. Borelli had prepared from the results of his own travels in that region, and also from information collected from reliable native sources. The principal feature in this map was the correction of a part of the course of the river Omo, which at about 5° N. lat., instead of flowing eastwards and becoming identical with the Juba, takes a westerly direction, and at 2° flows southwards into Lake Shambara. About the latter lake the traveller was unable to glean very much information.—M. Brau de St. Pol-Lias called the attention of the Society to an important general map of Cambodia, and a dictionary of the Khmer language, about to be published by Père Guesdon. This map, he explained, was accompanied by detail maps of the provinces of Pearn-Clor, Kien-tvai, Luc-Doc, and Phnom Penh, which had been prepared by the author at the request of the French Resident-General.—In conclusion, Viscount de Brottes read a paper upon his travels in Northern Chaco, in pursuance of the mission with which he had been entrusted by the Minister of Public Instruction.

Geographical Society of Berlin.—February 2nd, 1889: BARON VON RICHTHOFEN in the chair.—Dr. Ed. Seler read a report upon his archaeological journey in Mexico in the winter of 1887-8. Dr. Seler, starting from the capital, travelled over the country of the Huasteca Indians in the provinces of S. Luis de Potosi and Tamaulipas, proceeding by railway to S. Juan de los Lagos. From here in two days Potosi was reached by diligence. From Potosi to Tampico a railroad is in course of construction, but at present it is only open for a short distance, so that the journey from Potosi to El Maiz also had to be made by diligence, and from the latter point to be continued on horseback. Travelling in nearly all parts of Mexico is now very safe in consequence of the energy of the Government, and the robber bands of earlier days have everywhere disappeared. The territory of the Huasteca is an extensive forest country. The fertile mountain slopes and river lowlands are everywhere clothed with luxuriant tropical forest, in which fig-trees and, as underwood, bamboos are conspicuous. The open valleys and the high ridges which extend between the river-courses are covered with either thin or thick forests of fan-palms. In the clearings tall, many-coloured grasses and mimosa-bushes cover the ground. The principal villages are situated along the river-courses and upon the plateaus between the rivers. Numerous small ranches are scattered through the woods. The chief branch of industry is cattle-rearing. Horses, oxen, and mules live out in the forests and are driven into the corral only once a year. The oxen are driven in large herds via Huejutla to Pachuca, whence they are conveyed by rail to the capital, which draws its chief supply of meat from here. Agriculture is practised only to a very limited extent, and it is a significant fact that this country which could with a somewhat more extended cultivation supply half Mexico with maize, imports this very article from the United States. The inhabitants do not understand how to obviate the destructive effects of the droughts which occur from time to time, by means of irrigation works from the numerous rivers which for the most part flow in deeply eroded beds. The production of the country is very poor. The Indians cultivate maize, black beans, pepper, brown sugar, and smoke-dried bananas; they manufacture mats from palm leaves and agave fibre. The imports are coarse calicoes (*manta*), ribbons, beads, sewing needles, cheap articles of finery, harness, nails and coarse hardware, liquor, soap, and petroleum. Candles are

manufactured in the country itself from the plentiful supply of tallow fat obtained from the cattle. The intellectual condition of the inhabitants is but slowly advancing. Only very few of the people can read and write. Their amusements consist in fandango-like dances, cock-fighting, and horse-racing. The roads are merely avenues cut through the forests, which in the low-lying lands and at the river crossings are often exceedingly difficult, and are impassable to all but the native horses. The customary house in the country is the *jacal* (or "thatched house," from the Aztec *xa-calli*), the walls of which are constructed with bamboo sticks, bound together with *Ficus angelica*, while the roof is made of the leaves of the fan-palm neatly plaited and is absolutely watertight. In the larger villages there are also houses built of white bricks. The principal articles of food are black beans, coffee, and cakes of ground maize without salt, the so-called *tortillas*, which are always eaten warm and fresh. Inns are lacking everywhere, and the traveller has to rely on hospitality. One of the chief nuisances, both to man and beast, are the numerous ticks (*garrapatas*) which infest not only the woods but the houses. The antiquities of the country do not consist of such great pyramids as those of Xochicalco, or the Palaces of Palenque, but they possess a peculiar style of their own and afford important material for constructing the ancient history of Mexico. They are difficult to find, for since the days of Cortes the primeval forest has completely covered and buried them. The houses of the ancient inhabitants, probably also *jacals*, like those of the present population, stood upon raised foundations, consisting of small pyramids of regularly hewn stones, called *cues* or *cucillos*. Among these heaps of stones the stoutest trees of the virgin forest have, as if from choice, expanded and separated the stones from one another. The construction of railways has interfered with a large number of these *cues* and in this way a quantity of household furniture has been found, especially painted pottery, statuettes, &c., of beautiful form and made from excellent material. The tropical rain-showers also bring to light many things of the same kind. Dr. Seler then visited the territory of the Zapotecas in the province of Oaxaca. From the Esperanza railway station on the Mexico-Veracruz line, the traveller reaches Tehuacan along a horse-track. The diligence runs from the latter point to Tecomacaca; from there to Oaxaca the journey is continued in a sedan chair if the traveller does not wish to ride. On this road there are inns subsidised by the Government, where very good accommodation is obtainable. This journey can be accomplished in from four to five days. The condition of the province of Oaxaca is considerably more advanced than that of the country of the Huasteca. The land is richer and more cultivated, and the villages more town-like. Intellectually and scientifically it is the most advanced province of the republic. The many valleys which cut into the mountain masses, and the numerous rivers which have to be crossed, present special drawbacks to commerce. Oftentimes the river-bed itself forms the road, and in the rainy season (August to October) trade is often interrupted for months at a time. The territory of the Zapotecas is the land of earth-heaps and bastions. These exist partly in the form of fortifications, partly of tombs, many of which still remain to be opened, for the law which forbids the exportation of antiquities is only too well calculated to discourage every explorer. The principal result of Dr. Seler's journey, from an archaeological point of view, was the demonstration of the fact that the apparent and supposed fundamental difference between the Aztec hieroglyphics and the Maya manuscripts does not exist. The hieroglyphics discovered on the national sanctuaries of the Zapotecas might, in case of their being completely deciphered, afford a key to the proper understanding of the connection between the Maya and Aztec civilisation.—Dr. A. Schenck read a report upon his geological journey in Nama Land and Herero Land, in which he showed that the whole country between

Walfisch Bay and the Orange river is, in consequence of the purely mechanical decomposition of the prevailing granitic rock, which is taking place under the influence of the great daily variations of temperature, causing in many places the disintegrated surface to be taken away in the form of a crust, covered over with a sea of sand and granitic shingle, from which the highest elevations stand out like islands. The country is not suitable for agricultural colonies, and the proposed great dykes for damming up the water of the rivers, which is generally very deficient in quantity but is periodically swollen by the heavy thunder-showers, might prove, in most cases, unable to offer sufficient resistance to the heavy onslaught of the floods which rush down with incredible force, or they might cause an enormous expense out of all proportion to their possible utility. The coast and the interior stand in contrast with regard to the season of the rainfall. While on the coast the rain—and it is almost without exception misty rain—falls generally in the winter, the rainfall in the interior takes place only in the summer, and nearly always in the form of thunder-showers, which, as Dr. Schenck believes, are caused by the condensation of the moisture-laden air, which is brought to this part by the warm, humid, north-east winds from the more equatorial regions of Africa, through coming into contact with the cool south-west winds blowing from the coast into the interior. Still, in the winter on the coast, very hot and quite dry easterly winds were at times observed, which reduce the relative humidity to from 10 to 15 per cent. In respect to the distribution of rainfall according to the season of the year, the south-west coast corresponds with the régime of the western part of Cape Colony, while the interior resembles the eastern part of South Africa. Respecting the productiveness and prospect of profitable yield of the numerous mining places in the country, a definite opinion cannot as yet be formed. With reference to the configuration of Great Nama Land, the following facts are to be noted. From Angra Pequena to Aos the hilly region of the coast is traversed. A broad valley-like depression, filled up with drift sand, succeeds the wild jagged hills round Angra Pequena, which are about 500 feet high. East of this depression the country ascends and forms a stony desolate plain, out of which rise isolated peaks or longer mountain chains running in a north and south direction, like the Tsan Khaib and Tairub ranges. In this plain are found some springs containing bitter-salts, and during the rainy season water is also found in holes in the rocks which have been hollowed out by the sand. The whole of this district, as far as Aos, forms a connected mountain system composed of ancient rocks, granite, and gneiss, which has been buried by the sand, and from which only the highest parts stand out. Beyond Aos the traveller enters upon the steppe region, which is divided into detached plateau districts. Between Aos and the river-bed of the Goû-gib, on which Bethanien is situated, the Huib plateau stretches away to the north, as far as the region of Khuias, and to the south to a point a few miles north of the Orange. A long series of table-mountains, resembling in form truncated cones, mark the western escarpment of this plateau; the former are composed of granite and gneiss, and are covered with limestone and sandstone horizontally laid down. This plateau formed a succession of stony plains covered with sparse vegetation, between which run deeply eroded valleys, often like ravines. East of Bethanien, and corresponding with the line of a long geological fracture, extends the escarpment of a second plateau, the Han-ami, which is composed of horizontally-deposited slate, sandstone, and chalk, and stretches away to the north almost as far as Rehoboth; it is about 5000 feet in height. It descends towards the east with a very gradual slope at first, then more steeply to the plain of the Great Fish river, out of which, north of Bersaba, towers up the mighty porphyritic mass of the Geitsee Ghib. On the other side of the Fish river the plateau character of the country continues as far as the steep edge of the Karas plateau, which extends into the inhospitable bush-steppe of the Kalahari.

The northern part of Herero Land is of a somewhat different character, inasmuch as it is essentially a country of gneiss and granite mountains, forming in one part long mountain chains like that of the Khuis, in another part great mountain masses like the Erongo. Here also plateaus are not quite absent: thus, for example, north of Omaruru there is the plateau on which the Etyo table-mountain is situated, and again, the extensive plateau of the Omaverume or Water Mountain. A large part of all this region is covered with recent chalk deposits, which are distributed all over South Africa, and represent the deposits of former brackish water, thus affording proof that South Africa in earlier times possessed a great number of lakes, many of them very extensive, of which the present Lake Ngami and the lakes of the northern Kalahari desert are only the scanty remains.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian R.G.S.*)

EUROPE.

[**The Alps**].—*Les Alpes et les Grandes Ascensions.* Par E. Levasseur, Membre de l'Institut, etc., etc., avec la collaboration de Membres des Clubs Alpins. Illustrations, 44 cartes esquisses. Paris, Delagrave, 1889: 8vo., pp. 446. Price 5 francs. [Presented by D. W. Freshfield, Esq.]

M. Levasseur, the well-known geographer and statistician, provides us with a French equivalent to Dr. Umlauf's 'Alps.' Both works are framed on the idea that a work on the Alps should be mainly and minutely topographical. Much importance is attached to artificial divisions based more or less on irreconcilable considerations, and therefore necessarily more or less unsatisfactory. Such divisions are doubtless needful for descriptive purposes, but their importance is quite secondary.

Twenty years ago publishers had a tolerably sound conception of what a book on the Alps, intended as this is for the general public, especially as a school prize for young persons, should be. They understood that it must in the first place be readable, that it must furnish such a picture of the Alpine region itself, and such an account of its relations, social and historical, to mankind as a good lecturer would endeavour to set before an intelligent audience with some hope of holding their attention. We had then the works of Berlepsch, translated by Leslie Stephen, and of Bonney. The present volume deals inadequately with such subjects as mountain structure, lakes and glaciers, mountain life, and has an article on "Alpinism" which only needs to be read with Leslie Stephen's "Old and New Schools" in his 'Playgrounds of Europe' for its deficiencies to be recognised.

Again, is it desirable to convert maps into letterpress, by printing catalogues of peaks and passes and heights, unreadable and absolutely impossible to remember? Dr. Umlauf relieved this part of his work by chapters on the physical phenomena of the Alps. M. Levasseur has procured brief accounts of the ascents of their peaks from Alpine climbers of various nationalities. Few adventures make better reading than a well-described mountain climb—witness in our own literature, Tyndall, Leslie Stephen, Wills, and Whymper. But the story must have local and individual colour. The writer must be allowed space to dwell on the distinctive features of the group and peak, to enliven his story with characteristic incidents. These notes are too numerous and too compressed. M. Durier and M. Vallot among the French, Mr. Conway among the English writers, throw life into their contributions. They cannot modify the monotony of the general result. One merit, that of modesty, the climbing

contributors can certainly claim. With very rare exceptions, they do not overrate their exploits. Since the routes to Mont Blanc, now that an observatory hut is to be erected on the summit, are of some general importance, it may be worth noting that a retreat in bad weather from the Aiguille du Goûter is not, as M. Martel surmises, "le plus dangereux des casse-cou." It was made in the worst possible weather by the writer with Mr. W. F. Donkin and F. Dévonassoud in 1881 without difficulty of any sort.

It must be clearly understood that our criticisms deal with the plan, and not the execution of the work. We wish it had been more comprehensive, that the valleys and the middle zone of the Alps had received some of the space devoted to the crests. But as a book on Alpine topography and Alpine climbing it is carried out in all the more important respects with the care we should expect from a geographer of M. Levasseur's reputation.

Nor taking into account the prodigious number of proper names and figures contained in the volume are the errors of the press excessive, unless towards the close, where misprints, or inaccuracies, abound. The bibliography in particular is inadequate, loosely compiled, and full of blunders. It requires a most thorough revision.

The illustrations are scanty, and, with the exception of some lent by the French Alpine Club, indifferent. In the maps, clearness has been sacrificed to economy. The contouring is coarse and confused, and the method of colouring adopted (in some copies) singularly unfortunate. The large map is hardly adapted to its purpose, and has apparently been borrowed from some general atlas. On the other hand the volume is issued at a very reasonable price, and no purchaser can complain that he has not five francs' worth of solid information.—

[D. W. F.]

Asbóth, Johann [von].—Bosnien und Herzegowina. Reisebilder und Studien. Wien, 1888: 4to., pp. xii., iv., and 488.

Herr Asbóth here gives the results of his own travels worked into information derived from many sources, so that the book is a fairly complete account of Bosnia and Herzegovina. There are many details concerning the principal towns; a considerable section is devoted to the antiquities and history of the two countries, and the ethnology and the usages of its people. Scattered throughout the book will be found a good deal of geographical information, and appended are statistical tables and special maps. The book is amply furnished with excellent illustrations.

Bezenberger, [Dr.] Adalbert.—Die Kurische Nehrung und ihre Bewohner. Stuttgart, Engelhorn, 1889: 8vo., pp. 140. Price 7s. 6d.

This is one of the memoirs published by the Commission for the scientific "Länderkunde" of Germany. It deals with that long and narrow tongue of land which separates the Kurische Haff from the Baltic. Both the topography and the inhabitants of this district are of special interest, and Bezenberger has made a thorough study of both with very interesting results.

Déchy, Moriz von.—Mittheilungen über Bergreisen im Kaukasus, 1884-1887. Separatabdruck aus der Ö. A.-Z., vi., vii., viii., und x. Jahrgang. Wien, Adolf Holzhausen, 1889: folio, pp. 4. [Presented by the Publisher.]

Hunfalvy, Paul.—Die Völker des Ural und ihre Sprachen. Vortrag in der Ungarischen Geographischen Gesellschaft. Budapest, 1888: 8vo., pp. 56. [Presented by the Author.]

Schumacher, Gottlieb.—Pella. London, Palestine Exploration Fund, 1888: 8vo., pp. 78. Price 2s. 6d.

This work gives an account of the survey of Fabil (the ancient Pella), by Herr Schumacher for the Palestine Exploration Fund. It is the first time the place has been thoroughly examined. There is an excellent map and illustrations.

Tait, M.—*Yorkshire: its Scenes, Lore, and Legends*; elaborated from a prize essay written for the Bradford Geographical Exhibition, 1887. With contour maps of river-valleys, geological map, large folding map of the whole county, and a large folding map of "British and Roman Yorkshire," by F. D. King. Leeds, E. J. Arnold, 1888: small 4to., pp. vi. and 100. [Presented by T. G. Rooper, Esq.]

The action of this Society and its exhibition of geographical appliances excited great interest in Yorkshire, and especially in Bradford, thanks to the intelligent energy of Mr. T. G. Rooper, H.M. Inspector of Schools. It may be remembered that, at the request of the Bradford School Board, the exhibition was sent to that town and attracted many visitors. In connection with this a series of lectures were given and prizes offered for the best essays on the geography of Yorkshire and for the best maps, reliefs, and appliances illustrative of physical geography.

Mr. Tait's essay obtained the prize, and it is now published in an expanded form. It is a very fair example of the conception of Heimatskunde which prevails in Germany and Switzerland, including, as it does, not only geography in the strict sense, but topography, history, folk-lore, antiquities, industries, and social life. It is very creditable to Mr. Tait, who, we believe, is a teacher in a Board school, as is also Mr. King, whose maps illustrative of the text are very excellent productions. There are several illustrations.

Vidal-Lablache.—*Des Divisions Fondamentales du Sol Français*. Paris, Colin et Cie., 1888: 8vo. pp. 16. [Presented by the Author.]

M. Vidal-Lablache recognises five fundamental divisions of the soil of France from the geographical standpoint: (1) the Paris Basin; (2) the Central Plateau; (3) the West; (4) the South; (5) the Valley of the Rhine and Saône. Although these divisions are drawn from purely geographical considerations, M. Vidal-Lablache points out that to a great extent they coincide with the great geological divisions.

ASIA.

Dunlop, William B.—*The March of the Mongol*. Reprinted from the 'Asiatic Quarterly Review' for January 1889: 8vo., pp. 29. [Presented by the Author.]

[**India.**]—*Gazetteer of the Punjab. Provincial volume, 1888-9*. Compiled and published under the authority of the Punjab Government. 8vo., pp. xiv. and 262. [Presented by the Secretary of State for India.]

This is another of the excellent Gazetteers at present in course of publication by the various Indian Governments, and being a 'Provincial Volume' it is one of unusual interest. The subjects treated of are, Description of the Province, Geology, History, Statistical and Social, Land Tenures, Industries and Manufactures, Public Instruction, the Punjab University, Literary Societies, Railways, and Canals. Various authors have contributed the different parts, all of which have been handled with great ability, while those on the Geology, History, and Public Works of the Province will be found to be especially interesting. There is one geographical error which should be pointed out. On p. 6 it says that, "A few miles to the west runs the watershed between the Indian Ocean and the Bay of Bengal," and this should read, "the watershed between the *Arabian Sea* and the Bay of Bengal."

Rein, J. J.—*The Industries of Japan, together with an account of its Agriculture, Forestry, Arts, and Commerce*. From Travels and Researches undertaken at the Cost of the Prussian Government. London, Hodder & Stoughton, 1889: royal 8vo., pp. xii. and 570. Price 30s.

This is a translation of the second volume of Dr. Rein's great work, which has already taken its place as, on the whole, the best recent work on Japan. The original German edition was briefly noticed in the 'Proceedings' for 1887, p. 180. The translation is fairly well done, though it is frequently somewhat stiff and occasionally unidiomatic. English readers who do not know German have now access to an exhaustive work on Japan in all its aspects, by a

thoroughly competent and painstaking writer. The coloured illustrations in this work of the productions of Japanese art have never been surpassed and scarcely ever equalled. The three great subjects treated in the second volume are: 1. Agriculture and Forestry; 2. Mining; 3. Trade and Commerce. A series of statistical tables are appended, which ought to have been brought up to a later date than 1885.

AFRICA.

Bissuel, Capitaine H., Chef de Bureau Arabe.—*Les Touaregs du Nord*. Alger (Jourdan), 1888: 8vo., pp. xix. and 203, with two maps.

The country here described is entirely unexplored. In the summer of 1887 a party belonging to it made an incursion into the territory of the Chanba of El-Golea; they were overcome, some of their number were killed, and others, contrary to all precedent, were delivered over to the French, by whom they were interned at Algiers. The work in question, as well as the maps, is based on information obtained from them.—[R. L. P.]

[**Crowther, S. A.**].—List of certain Places on the Niger, Binue, the Interior Countries, and the Bight. Some of which have been visited by C.M.S. Agents. Others collected for their information from the caravans. Printed at the Lower Niger Mission Press, Brass [1884]: 12mo., pp. 13. [Presented by H. H. Johnston, Esq.]

Hyland, J. Shearson.—*Über die Gesteine des Kilimandscharo und dessen Umgebung*. Wien, Hölder, 1888: 8vo., pp. 66. [Presented by the Author.]

This is a reprint of a paper from Tschermak's 'Mineralogische und Petrographische Mitteilungen,' and deals in an exhaustive manner with the character of the rocks of Kilimanjaro and the surrounding region.

Sudan Almanac, 1889. Compiled at the Intelligence Division, War Office. Calculations made at the Nautical Almanac Office. [London, Harrison and Sons]: 12mo., pp. 14. [Presented by the Intelligence Department of the War Office.]

Staudinger, Paul.—*Im Herzen der Haussaländer*. Berlin, Landsberger, 1889: 8vo., pp. x. and 758. Price 13 marks.

This is a very detailed account of the journey made by Herr Staudinger in 1885-86, up the Niger and Binue into Sokoto, as far as Kano and Gandu. He was bearer of presents from the late German Emperor William I. to the Sultan of Sokoto, but did not succeed in attaining the allegiance of that potentate to Germany. Although the author did not break up any new ground, still his book may be taken as a substantial addition to our knowledge of the region which he visited.

Taylor, Ellen M.—*Madeira, its scenery and how to see it*. With letters of a year's residence, and lists of the trees, flowers, ferns, and seaweeds. 2nd edition, revised. London, Stanford, 1889: 8vo., pp. xvi. and 265. [Presented by the Publishers.]

This edition of a very useful book has evidently been very thoroughly revised and brought up to date.

[**Uganda Mission.**].—*The Story of the Uganda Mission and the Church Missionary Society's work in Eastern Equatorial Africa*. With twenty-two illustrations and a map. London, Church Missionary House, and Seeley, Jackson, & Halliday: 4to., pp. 23. Price 6d. [Presented by the Church Missionary Society.]

AMERICA.

[**America, United States.**].—Hydrographic Office, U.S. Navy. G. L. Dyer, Lieutenant U.S.N., Hydrographer to the Bureau of Navigation. [Nautical Monographs, No. 5.] *The Great Storm off the Atlantic Coast of the United States*,

March 11-14, 1888. By Everett Hayden, in charge of the Division of Marine Meteorology, Washington, Government Printing Office, 1888: 4to., pp. 65, charts. [Presented by Lieutenant G. L. Dyer, U.S.N., Hydrographer.]

Davidson, James Wood.—The Florida of To-day. New York [and London], D. Appleton & Co., 1889: cr. 8vo., pp. 254, maps and illustrations. Price 6s. [Presented by the Publishers.]

This little volume is intended as a guide for tourists and settlers. It contains some useful notes on the history, geography, climate, divisions, health, geology, routes of travel, population, education, productions, sport, &c. In the Appendix the various railway and river routes are described; a list of hotels in Florida is also given.

Junker von Langegg, Ferd. Adalb.—El Dorado. Geschichte der Entdeckungen nach dem Goldlande El Dorado im XVI. und XVII. Jahrhundert. Leipzig, Wilhelm Friedrich, 1888: 8vo., pp. xviii., 128 and 132.

This volume by Herr Junker is evidently the result of great research. It is a history of the various explorers that went out in the 16th and 17th centuries in search of El Dorado. The author has thus rendered some service to the history of geographical exploration. The second part of the work consists of a series of notes on the geography, ethnography, and natural history of the West Indies and South America, mainly the results of Herr Junker's own journeys in these regions. In them will be found much curious and useful information.

Léal, Francisco Alvarez.—La République Dominicaine. Territoire, Climat, Agriculture, Industrie, Commerce, Immigration et Annuaire Statistique. Paris, Imp. Lucien Beillet, 1888: 8vo., pp. 79.

Payne, F. F.—Eskimo of Hudson's Strait. Extract from Proceedings of Canadian Institute, 1889. Toronto, 1889: 8vo., pp. 18. [Presented by the Author.]

Pérez, Felipe.—Geografía General del Nuevo Mundo, y particular de cada uno de los países y colonias que lo componen. Bogotá, 1888: 12mo., pp. 2 and 212. [Presented by the Author.]

This is a manual of geography compiled for use in the schools of Spanish-speaking countries in South America. It is of limited scope, but seems creditably done.

Roosevelt, Theodore.—Ranch Life and the Hunting Trail. London, Fisher Unwin [1888]: 4to., pp. [vi.] and 186. Price 21s. [Presented by the Publishers.]

This is one of the truest and most interesting accounts of ranch and sporting life in North America which has been published. It evidently deals with plain facts, and abstains from romance. It depicts every phase of the life of the ranchman, the descriptions being much assisted by the many beautiful and evidently truthful illustrations. Incidentally, one may learn a good deal concerning the geography of the region dealt with, and especially about its animal life.

AUSTRALASIA.

[Australia.]—The Australian Handbook (incorporating New Zealand, Fiji, and New Guinea). Shippers' and Importers' Directory and Business Guide for 1889. London, Melbourne, Sydney, Brisbane, Gordon & Gotch, 1889: large 8vo., pp. 613 and 271, maps and plans.

Includes an article on Australian commerce, entitled, "The Early Struggles of Trade in Australia," by S. Bonwick, Esq.

Gisborne, William.—The Colony of New Zealand, its History, Vicissitudes, and Progress. London, Petherick & Co., 1888: 8vo., pp. xii. and 360. Price 7s. 6d. [Presented by the Author.]

This is an excellent and trustworthy manual of information on New Zealand in all its aspects. The history is briefly traced from its discovery down to the present day; after which we have a fairly full account of the geography of the islands, their industrial, social, and political conditions, with some very useful information for emigrants and capitalists. There are good maps of New Zealand, of the Taupo volcanic zone, and the Tamwera region.

Jack, Robert L.—Queensland Commission. Centennial International Exhibition, Melbourne, 1888. The Mineral Wealth of Queensland. Brisbane, Warwick and Sapsford, 1888: 8vo., pp. 71, map. [Presented by Mr. R. L. Jack.]

[**Victoria.**]—Victorian Year-book for 1887-8 (Fifteenth Year of Issue). By the Government Statist of Victoria. Volume I. Introductory Remarks. Population. Finance. Vital Statistics. Melbourne; London, Trübner & Co., 1888: 8vo. pp. 422. [Presented by the Government Statist of Victoria.]

GENERAL.

Benko, Jerohm [Freiherr von].—Reise S.M. Schiffes "Albatross" unter Commando des k. k. Fregatten-Kapitäns Arthur Müldner nach Süd-Amerika, dem Caplande, und West-Afrika 1885-1886. Pola, 1889: 8vo., pp. x. and 463. Price 7s. [Presented by the Publishers.]

This record of the voyage of the Austrian ship *Albatross* contains a very complete account, geographical, scientific, industrial, and commercial, of the various countries and regions visited,—Morocco, Brazil, Argentine Republic, Cape Colony, the Portuguese West African Colonies, the Congo, and Sierra Leone. The oceanic observations include winds and currents, as well as other points, and much information is embodied in the chart which accompanies the book.

Blytt, A.—Additional Note to the probable cause of the Displacement of Beach-Lines. [1889]: 8vo.

[**Brassey, Lady.**]—The Last Voyage to India and Australia in the 'Sunbeam.' By the late Lady Brassey. London, Longmans & Co., 1889: 8vo., pp. xxiv. and 490. Price 21s. [Presented by the Publishers.]

There is no doubt that the late Lady Brassey's pleasant narratives have done much to spread among her many readers some general idea of the geography of those parts of the world which she visited in her famous yacht, the *Sunbeam*. In the present volume, which includes much of India, Labuan, Borneo, Celebes, and Australia, there are many details as to existing conditions which will prove serviceable even to the geographer, especially when taken in conjunction with the beautiful and instructive illustrations. The book, like Lady Brassey's other books, is attractive reading; there is a memoir of her life by Lord Brassey. There are two small maps, a track chart, and a map of India.

[**British Trade.**]—Sequel to Synopsis of the Tariffs and Trade of the British Empire. Prepared and presented to the Commercial Committee of the Imperial Federation League by the Chairman, Sir Rawson W. Rawson, K.C.M.G., C.B. Published at the office of the League, 1889: 8vo., pp. viii. and 160. Price 5s. [Presented by the Author.]

This is a careful, clear, and detailed examination of the progress of the trade and shipping of the United Kingdom from 1854 to 1888; with tables showing the share of the various portions of the Empire in the imperial trade. Sir Rawson

Rawson proposes a simple and ingenious test for comparing the trade of different years by dividing the total value by the total tonnage. The synopsis might prove serviceable to the student of commercial geography.

[**Educational.**—Graphic Pictures of Native Life in Distant Lands, illustrating the Typical Races of Mankind. Depicted by H. Leutemann. With explanatory text by Professor A. Kirchhoff. Translated from the German by George Philip, jun. With twelve plates printed by G. Löwensohn Fürth. London, G. Philip & Son, 1898: folio, pp. 52. Price 7s. 6d. [Presented by the Publishers.]

These pictures, if somewhat rude, are graphic, and fairly typical of the leading non-European races. They show the various peoples in their daily life amid all other native surroundings, and are well calculated to be both attractive and instructive. The text has been well translated, is quite adapted to the pictures, and full of useful information.

[**Geodetic Institute.**—Veröffentlichung des Königl. Preussischen Geodätischen Institutes. Astronomisch-Geodätische Arbeiten I. Ordnung. Telegraphische Längenbestimmungen im Jahre 1887. Bestimmung der Polhöhe und des Azimutes auf den Stationen Rauenberg und Kiel in den Jahren 1886 und 1887. Berlin, P. Stankiewicz, 1889: 4to., pp. vi. and 268. Price 15 marks.

— Veröffentlichung des Königl. Preuss. Geodätischen Institutes. Das Märkisch-Thüringische Dreiecksnetz. Berlin, J. Springer, 1889: 4to., pp. viii. and 144, map.

Geographisches Jahrbuch. Begründet 1866 durch E. Behm. XII. Band 1888. Unter Mitwirkung von A. Auvers, Fr. Boas, J. J. Egli, S. Günther, M. Heinrich, G. Hirschfeld, H. Lullies, W. Sievers, H. Wichmann, W. Wolkenhauer, herausgegeben von Hermann Wagner. Gotha, Justus Perthes, 1888: 8vo., pp. x. and 480. Price 12s.

The new issue of this invaluable year-book is of a specially cartographical character. Professor Günther writes an important section on recent progress in map-projections; Colonel Heinrich contributes an exhaustive paper on the standpoint of official cartography in Europe; while in an appendix Professor Wagner brings together a series of index maps of the most important survey maps published by various Governments. Dr. Egli has a paper on progress in geographical etymology; recent exploration in North America is dealt with by Dr. Fr. Boas; in Central and South America by Dr. W. Sievers; in Asia by Dr. H. Lullies; in Africa by Herr Wichmann. There is a learned paper by Professor Hirschfeld on our geographical knowledge of the old Greek world; while Professor Wagner has his usual report on progress in geographical method and education, to which we have already alluded.

[**Germany.**—Weissbuch. Vierter Theil. Berlin, 1889: imp. 8vo., pp. xii. and 84. Price 4s.

This official publication of the German Government consists of correspondence dealing mainly with German interests in East Africa.

Götz, (Dr.) Wilh.—Die Verkehrswege im Dienste des Welthandels. Eine historisch-geographische Untersuchung; mit einer Einleitung für eine "Wissenschaft von den geographischen Entfernungen." Stuttgart, Ferd. Enke, 1888: 8vo., pp. xvi. and 806. Price 20 marks.

This may be regarded as an elaborate and laborious history of trade-routes and trade-centres, and therefore of trade, from the earliest times down to the present day. The author tells us it is an attempt to construct a science of distances, though it is not quite clear what he means by that. The book is intended more as a help to history than to geography; it certainly contains a vast amount of information as to the course of trade in the various countries of the world, and as to the influence which trade routes have had on

commerce, that will prove serviceable to the student of commercial geography. Appended is a series of five isochronic (or isohemeral) charts, dealing with different periods from 350 a.c. downwards, suggested by Mr. F. Galton's paper and chart in the 'Proceedings' for 1881.

Guyot, Arnold.—Géographie Physique Comparée, considérée dans ses Rapports avec l'Histoire de l'Humanité. Avec une Préface de M. Vivien de St. Martin. Paris, Hachette & Cie.: 8vo., pp. iii. and 328. 7 [Presented by M. Ch. Faure.]

This is not a translation of Guyot's 'Earth and Man'; it is really the original text, never before published, from which the English edition is a translation. Prefixed is a life of Guyot, by M. Ch. Faure.

Hull, Edward, [LL.D., F.R.S.]—A Text-book of Physiography or Physical Geography, being an Introduction to the Study of the Physical Phenomena of the Globe. London, Deacon & Co., 1888. Price 5s. [Presented by the Publishers.]

The term physiography has come to have the vaguest possible signification. Like so many other writers of such text-books, Dr. Hull makes it synonymous with physical geography, which is certainly what was never intended by those who first introduced the term in English. Physiography is really an introduction to the study of nature and its forces, and is a preliminary necessary to a thorough study of physical geography. The book is divided into four parts:—I. Astronomical and Introductory; II. Terrestrial Physics and Mechanics; III. Physical Features of the Globe; IV. Distribution of Plant and Animal Life. The last part is on the whole the best. There are statements in the book concerning the earth's interior, coral islands, and other matters which seem strange coming from a geologist of the reputation of Dr. Hull. There is nothing in the book that should lead us to prefer it to several of the other text-books of physiography which are in the market.

Kan, [Prof. Dr.] G. M.—Het Hooger Onderwijs in Aardrijkskunde huite Lande. Leiden, Brill, 1889: 8vo., pp. 47. [Presented by the Author.]

This interesting paper deals with recent progress in geography in the various countries in Europe, special prominence, of course, being given to the position of geography in Holland.

London Geological Field Class: Excursions for the study of the country round London, under the direction of Prof. H. G. Seeley, F.R.S., during the summer of 1888. Reported by Members of the Class. With lithographed sections. London, G. Philip and Son, 1889: 8vo., pp. 40. Price 1s.

Monaco, [Prince] Albert de.—Sur l'alimentation des naufragés en pleine mer. [Paris, Gauthier-Villars et Fils, 1888]: 4to., pp. 3.

- Sur l'emploi de nasses pour des recherches zoologiques en eaux profondes.
- Sur un dispositif destiné à éclairer les eaux profondes. Par M. F. Regnard. [Paris, Gauthier-Villars et Fils, 1888]: 4to., pp. 7, illustrations.
- Sur la quatrième campagne scientifique de l'*Hirondelle*. [Paris, Gauthier-Villars et Fils, 1888]: 4to., pp. 3.

Ruge, [Dr.] Sophus.—Abhandlungen und Vorträge zur Geschichte der Erdkunde. Dresden, G. Schönfeld, 1888: 8vo., pp. [vi.] and 268. Price 4s. 6d.

This is a series of papers on subjects more or less connected with geography, by Dr. Ruge, professor of geography at the Dresden Polytechnic. The first paper is on the Historical Widening of the Horizon, tracing briefly the gradual development of the conception of geography. The second paper is a sketchy article entitled Frost Stories, while the third treats of the first circumnavigating voyage under Magellan. Other papers treat of the Anian Bay Question, of pre-Defoe Crusoes, and the first settlers in Juan Fernandez; the Sturm and Drang period of geography, proving the existence of a geographical society in

Nuremberg in the middle of the 18th century; the importance of the year 1781 in the history of geographical progress; history of the exploration of Bismarck Archipelago; the historical development, and the growing importance of the New World; the importance of the last twenty-five years (1868-88) in the progress of geography; and the London African Association.

Sans, [El M. R. P.] Rafael.—*Memoria Historica del Colegio de Misiones.* La Paz, 1888: 8vo., pp. xvi. and 239. [Presented by the Author.]

This is a volume of the 'Biblioteca Boliviana de Geografia e Historia'; the first volume of which was noticed in the 'Proceedings' for 1888, p. 741. Although it deals mainly with the history of missions in Bolivia, there is incidentally a good deal of geography in the book.

Statesman's Year-Book, The.—*Statistical and Historical Annual of the States of the Civilised World for the year 1889.* Edited by J. Scott Keltie, Librarian to the Royal Geographical Society. Twenty-sixth Annual Publication. London, Macmillan & Co., 1889: 8vo., pp. xxvii. and 1004. Price 10s. 6d. [Presented by the Publishers.]

Χαμουδουπουλος, Μηναι Δ. Γεωγραφια φυσικη και πολιτικη προς χρειν των Ελληνικων Σχολειων και Παρθενιαγωγειων εν Αθηραις: Εκ του τηρογραφειου των καταστηματαυ Αριστη Κωνσταντινιδου. 1888, 8vo, pp. 463. Price 3 francs. [Presented by the Author.]

It is satisfactory to find that the Greek schools have so good a geographical text-book available. The book is written on the old lines, but it is methodical, well balanced, and so far as tested, is accurate and up to date. Unfortunately it has neither contents nor index. Our English names look strange under such forms as Γρεενβίχ, Σαταμ, Οδινδουρ, Πόρτ-σμάουθ, Κέμπριτζ, &c.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Liguria.—*Carta Topografica della — e Provincie Limitrofe (le due Riviere tra Nizza e Livorno).* Scale 1:200,000 or 2·7 geographical miles to an inch. Genova, A. Donath, editore, 1889. (2 fogli in cromolitografia.) Price 4s. (*Dulau.*)

This map has, we presume, been specially prepared for the use of tourists, but though the positions of all villages are very clearly shown, the same cannot be said of the tracks connecting them, which indeed in most cases are only indicated by faint lines, easily mistaken for mountain streams, and in some instances being altogether lost in the hill-shading. The author will do well, in any future edition that may be published, to mark these tracks in a more decided manner, so that the map may be of some real use to pedestrians, who are seldom content to keep to the main roads.

ORDNANCE SURVEY MAPS.

Publications issued during the month of January 1889.

6-inch—County Maps:—

ENGLAND AND WALES: Anglesey: 25 N.E.; 18. **Cardiganshire:** 21 N.W., N.E., S.W., S.E., 27 N.W., S.W., 31 N.W., 32 N.W., N.E., S.W., S.E., 33 N.E., 34 N.W., N.E., 39 N.W., N.E., S.E., 40 N.W., S.W.; 15, each. **Carmerthenshire:** 39 N.E., 47 S.E., 48 S.W., 64 N.W., S.W.; 15, each. **Carmarvonshire:** 38 E., 4 N.E., 7 S.E., 12 N.W., N.E., 13 S.W., S.E., 17 N.W., N.E., N.E., S.E., 18 N.E., 24 N.W., S.E., 32 S.W., 39 N.W., S.W., S.E., 40 N.W., 44 S.W., S.E., 45 N.W., S.W., 46 N.W., S.W.; 15, each. **Cornwall:** 23 S.E., 27 S.E., 36 N.E., S.E., 37 N.W., N.E., 44

No. III.—March 1889.]

ATLASES.

Letts's Popular Atlas, being a series of Maps delineating the whole surface of the Globe, with many special and original features; and a copious consulting Index. 2nd edition. London, Mason & Payne, and Hutchinson & Co., 1889. Price 2l. 2s.

The present edition of this atlas is a decided improvement on the last. The maps are now given on a single sheet, whereas in the previous edition they were on two, and in consequence of the style of binding adopted, the central portion of many of them could not be seen. Some additions and corrections have been made, but much still remains to be done in this direction.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von —. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Achte (8) Lieferung. Inhalt: Nr. 13, Deutsches Reich, Blatt 4 in 1:1,500,000, von C. Vogel. Nr. 31, Frankreich, Blatt 4, in 1:1,500,000, von C. Vogel. Nr. 95, Süd-Amerika, Blatt 6, in 1:7,500,000, von O. Koffmann. Gotha, Justus Perthes, 1889. Price 1s. 6d. each part. (*Dulau*.)

Sheet 13 contains parts of Bohemia and Silesia, a plan of Berlin and its environs, on an enlarged scale, maps of the coal district of Saarbruck, the mining and smelting industries of Upper Silesia, and plans of naval ports of Wilhelmshaven and Kiel, in both of which the five-fathom line of soundings is laid down. Sheet 31 contains the south-eastern portion of France, and parts of Lombardy and Piedmont, the Island of Corsica being given on an inset map of the same scale. This sheet contains some good specimens of hill shading, and lines of soundings, commencing at a depth of three fathoms, and ending at five hundred fathoms, are given. There are in all seven of these lines, the first, as already stated, commencing at three fathoms, and the others at ten, twenty-five, fifty, one hundred, two hundred and fifty, and five hundred fathoms respectively.

With the exception of a small portion of the country at the mouth of the river Plate, sheet 95 is devoted to a map of the Isthmus of Panama, and plans of South American sea-ports. They are all beautifully drawn, and in every case lines of soundings are marked, but the system is not uniform, some depths being given in metres, some in brazas, and some in varas; this leads to confusion, and as very many of the subscribers to this atlas will, in all probability, know but little of the relative values of these measures, it is to be regretted that the soundings have not been reduced to some well-known uniform standard.



BRITISH COLUMBIA

FROM A SURVEY BY

Rev. W. S. Green, M.A.

1888

	Watershed	Route
Heights determined trigonometrically		4124
Do. barometrically by author		5201

SCALE

1 mile = $\frac{1}{4}$ inch.



W. & A. Green, Edinburgh & London



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Explorations on the Chindwin River, Upper Burma.

By Colonel R. G. WOODTHORPE, R.E., C.B.

(Read at the Evening Meeting, December 17th, 1888.)

Map, p. 260.

SOUTH of the Brahmaputra river, and running generally parallel with its course, lie the hill ranges which separate, first Assam from Cachar, and then Assam from Burma. Starting from the Garo Hills, these ranges rise through the Khasia and Naga Hills, gradually higher and higher till they culminate, to the west of Samaguting, in some lofty peaks, which, strange to say, are not on the main range, but on spurs thrown out from it. The principal of these peaks is Saramethi, which attains a height of nearly 13,000 feet. To the south the hills run down past Manipur into the Lushai country, separating Burma from Chittagong. To the north-east they run up to the Patkoi, forming the watershed between Assam and Burma. From Saramethi they diminish in height till Maum Peak is reached, which is 7000 feet above sea-level. Here a drop of 3000 feet occurs, and the range narrows considerably, affording, without doubt, at the Patkoi Pass the easiest route from Upper Assam to Upper Burma; and at one time, not so very long ago, but before any thought of the annexation of Burma occupied men's minds, this route had attracted a good deal of attention, and had been much discussed as the most promising by which to open out a trade route between Assam and China. Wilcox, Hannay, Griffith, and Bayfield are all well known as early explorers in these regions, Wilcox being the earliest and perhaps the ablest; but for many years very little has been done to improve our knowledge of the country through which a practicable route can be found to China. In 1884-5 Major Macgregor and I visited the Khamti country by way of the Dian, and in returning crossed the Patkoi at a low elevation and struck the Chindwin river not far from its sources, which are approximately in lat. 27° and long. 97°. Our way lay for some little distance along this river, which is there known as the Turong Kha. Major Macgregor described to you here two years ago our journey and

its difficulties, principally caused by the excessive rainfall. The lateness of the season and the swollen state of the rivers prevented our exploring towards the Hukong Valley that season, and the next saw me in Gilgit, on the opposite frontier of India. Last cold weather an attempt was made by Mr. Needham, political officer at Sadiya, accompanied by Captain Michell, D.Q.M.G., and my late assistant, Mr. Ogle, as surveyor, to penetrate to the Hukong Valley, but it was not successful, owing, as I understand, to failure of supplies, and the party returned before reaching that valley, and our knowledge of it and its inhabitants is still incomplete.

I cannot help thinking that if we had been able to cultivate more friendly relations with the Hukong Singphos in the years gone by, we should have had their assistance in quieting the Mogoung district, which has given us much trouble. A great gap exists, on our maps, in the course of the Chindwin river between latitudes 26° and 27° , but I think that the course marked on the map accompanying this paper is fairly correct; and it will be seen that the general direction of the Chindwin river throughout its length is a little east of south till, at Mingin, it turns towards the Irawadi. Just at its sources the highest ranges lie on its left bank, but from where our knowledge of it again is certain, the high land is all on the right bank, the general level of the country to the east being very low. At about latitude $25^{\circ} 20'$ you will see that the Chindwin receives a tributary, called there the Tuzu. The course of this river was at one time a geographical puzzle. Major Godwin-Austen first saw its southern branch in 1872-73, and it was then seen to flow for many miles in a north-easterly direction, the valley being shut in to the east by a lofty range, the peaks of which rose to over 12,000 feet, and it seemed impossible that this river, flowing at an elevation of only 2000 feet, could find an exit between any two of these peaks. Nevertheless it was so. In March 1874, travelling down the southern branch, our path lost sight of the stream for a short time, and when we next sighted it, it was flowing in the opposite direction: the river, in width, velocity, and character, was the same, but it was flowing backwards. A little clearing of jungle on a favourable point showed us that just beneath us these two streams flowing, one from the north-east, the other from the south-west, joining their forces, turned off at a right angle towards Saramethi, and forced a passage through the range between two mighty spurs, which, overlapping each other, completely shut out all view of the gorge of exit till we were exactly opposite to it. I climbed to a high point below Saramethi and looked down the gorge. It was a magnificent country, the lower hills soft and covered with vegetation, the higher ranges bold and steep, clad with majestic pines, and above all the rugged and bare rocky precipices of snow-capped Saramethi; while in every glen and ravine streams leapt and tumbled with thunderous roar to join the river

flowing thousands of feet below. The southern warder of the gorge rises to 11,000 feet, and between it and Saramethi lies a distance as the crow flies of only about 20 miles; and yet midway between these two peaks, and at a mean depth of 10,000 feet below their crests, the Tuzu finds its way out to the plains of Burma. Looking through the gap I could see beyond it—nothing. It seemed as if we had reached the lofty mountains, which, as the ancients believed, encircle the world, and that beyond the gorge the river must empty itself into space. We longed to explore the mysteries beyond, but the season for safe travelling was nearly past, our supplies had run very short, the country was inhospitable, and we were beyond interpretation, even our interpreters and guides from our last camp, a few miles off, being unable to understand the dialect of the villages we had then reached. We could therefore ask no questions as to our chances of reaching the Chindwin. Rafts would probably not have lived, and the difficulties of forcing a path through the gorge and beyond, with our limited time and engineering appliances, would have been insuperable. Once on the Chindwin we might have got on.

I was unable to reach the junction of the Tuzu and Chindwin last year, but after I had left Burma, Major Raikes, Deputy Commissioner of the Chindwin, went up in a steamer during the rains, in July or August, and apparently found villages, though poor ones, above the mouth of the Tuzu. Strange to say, although the steamer must have been twice past the mouth of the Tuzu, on neither occasion did any of the party on board notice where the Tuzu joined the Chindwin; which seems very strange, as it is by no means an insignificant stream, unless its fondness for surprises carries it off in some quite unexpected direction. During the rains the Chindwin is navigable for a steamer drawing four feet of water, up to about latitude 26°. I can only speak roughly, as I have not seen any map of the course. Further progress was stopped by a barrier of rock running right across the river, causing a waterfall of some four or five feet. Before this was reached, the villages, which had been growing fewer and farther between, and ever poorer, had ceased altogether. Native information states that the river is unnavigable above this barrier till the Hukong Valley is reached, where the stream is sufficiently gentle for boats to be employed. As in the case of all rivers in this region of excessive rainfall, the Chindwin rises very considerably during the rains, but in the cold weather, and especially during March, April, and May, it is so shallow in places as to make navigation difficult even for small steam-launches; while, here and there, whirlpools and narrows are the terror of steamer captains; and in April each of the three Government steamers came more or less to grief—one of them on its very first trip to Kendat. No doubt the navigation could be improved without very much difficulty, though shifting sandbanks are continually changing the position of the channels.

Above the junction of the Uru river with the Chindwin is the tea district. I could not visit it, but I overlooked it from a hill on the right bank of the river opposite Homalin. My guide told me that the Maharajah of Manipur makes a large profit out of the tea seed, which he buys in Thaungdut, and sells in Cachar. My guide, who spoke English, also said, "By and by plenty gentlemen coming here, then seeing many bungalows all over that side." A good deal of rice is exported from the upper Chindwin, and one noticeable feature on the river is the number of long bamboo rafts, each of which carries what at first seems to be a small and neatly built village, but which is really a number of small storehouses for grain, and one or two huts for the raftsmen and their families. I was told that the commercial steamers often do a good business in grain-carrying. The officers of the Bombay Burma Corporation have long carried on extensive operations in the magnificent teak forests of the Chindwin and Kaba valleys; they have several stations on the river, the highest being Kendat. It will be remembered that King Thibaw's repudiation of the agreement with this company and confiscation of their property were among the causes of the war. When war was declared, several of the company's officials were killed, and others had very narrow escapes.

South of Manipur, and bounding Burma on the west, lies a mass of lofty hills, running in parallel ridges north and south, and inhabited by the tribes known as Chins, Lushais, Shendus, and Kukis, all, I imagine, closely allied. As the Lushais used to raid on our eastern frontier, and do still on the Chittagong border,* so do the Chins raid on Burma. They hold that human sacrifices are necessary to ensure the success of their agricultural operations, and their views have not changed with the change of administration in Burma, and their raids are not at all a consequence of our annexation of that country. It may be necessary, before these tribes can be induced to settle down quietly, to send a small force against them from Burma to operate simultaneously with one sent from Chittagong. This would be the best way of opening up the hills, but such expeditions are costly, the country is very difficult for troops, and the transport has to be carried on entirely by coolies; but unless met from both sides the Chins would merely retire before us. In the meantime, a special "Chin levy" is being raised, and precautionary measures are being taken to protect, as far as possible at present, our Burmese subjects from Chin incursions; and certainly not too soon if, as stated in a late Indian paper, it is true that in the month of October, twelve Burmese were killed, many wounded, and 120 carried off into slavery by the Chins.

As to the climate, a little rain fell in December, and there were a few

* Only two or three days after this paper was read, the telegraph brought news of a serious Chin raid on the Chittagong border, which necessitated an expedition being sent from that side as well as from Burma.

wet days in the beginning and end of January, otherwise it was fine and pleasant. Towards the end of March there were a few thunderstorms, and the weather became very hot, continuing so up to April and May, when the thermometer averaged 100° in the shade; but it was dry, and the temperature was pleasanter to bear than in Calcutta at 85° .

Now to turn to the more narrative portion of this paper.

On my return from Gilgit to Simla, in September 1886, I found that a proposal had been made by the Chief Commissioner of Assam and General J. Gordon, C.B., commanding the North-east Frontier District, to the Government of India for an exploration of the route between Mákum and Bhámo; and it was proposed, moreover, that I should conduct this.

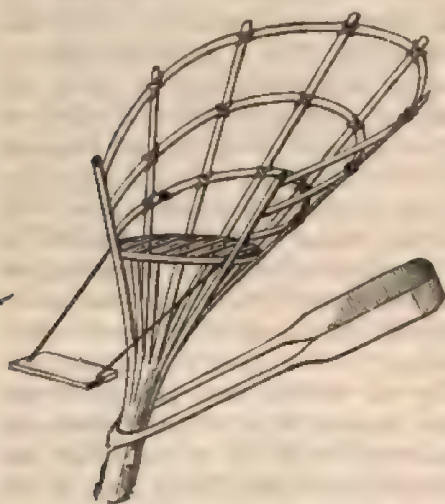
After much consideration the Government finally decided to postpone the survey of this route for various reasons, not the least cogent being that the country about Mogoung was in such a disturbed state that it might be dangerous for a small party to attempt to pass through from the Hukong valley, and a large party could not have attempted it for want of carriage and supplies. Sanction was, however, given for a small force to proceed from Manipur to the Kabu valley and the Chindwin river, under General J. Gordon, and I was permitted to accompany this force. I left Simla on the 28th October and proceeded to Calcutta, where I was joined by my assistant, Mr. Ogle, a gentleman who has been my companion in many of my exploratory trips in Assam and elsewhere. He is an excellent surveyor, with great powers of endurance and energy, combining personal courage with discretion, and possessed of a good deal of forethought and resource: he is, moreover, a pleasant and utterly unselfish companion, and as staunch a comrade as one could wish for. To him I owe much of the success which I have achieved in the survey. It is too often the case that the head of an enterprise gets all the credit of success, and those who assisted him to it are overlooked; and Mr. Ogle has not, I fear, met with the general recognition to which his merits and worth entitle him, and I often regret that it has never been in my power to do more for one who has done so much for me. My other assistants were, a native surveyor Bapu Jadu, a Mahratta, an excellent man who had been employed with me on the Gilgit and Chitral Mission, and a native cavalryman, Sawar Kishan Sing, of the 13th Bengal Lancers, a very fine specimen of a Sikh soldier. He also had been employed in Chitral and Gilgit, and turned out excellent work.

Our equipment consisted of (1) a Troughton and Sims' 6-inch subtense theodolite with micrometer eye-piece and complete vertical circle; and for general work, whether trigonometrical or astronomical, such as I was engaged on, there could not be a better instrument. (2) A subtense instrument for routes and traverses. This consists of a small telescope mounted above a prismatic compass, the whole fitting on a light stand. The telescope is fitted with micrometer eye-piece, the

wires in which can be made to intercept a given length, say 5 or 10 feet, of a rod held by a man on the spot, the distance of which from the observer is required. A table in the observer's note-book gives the distances corresponding to the angles subtended by the rod, and the compass gives the direction. Thus bearing and distance can be plotted at once. I have often used this instrument, and found it excellent, being able to do as much as 18 to 20 miles of very accurate route survey or traverse in a day.* Of course, each surveyor had his plane-table; and a small supply of hypsometers, aneroid barometers, and chronometer watches completed our equipment.

We travelled by way of Cachar, where we halted for a few days to pick up our coolie establishment from the Khasia Hills, men who certainly make the best porters for the hills on that frontier. They are strong, hardy, cheerful, easily contented, and can carry a load of 60 lbs. in addition to their own little belongings, generally, in all, over 70 lbs. We had one man once with a great appetite, who was never satisfied with the ordinary coolie ration of 2 lbs. of rice daily, but wanted twice that amount: he was told that if he had two men's rations he must

carry two men's load, and this he willingly agreed to do, and did. They carry their load suspended by a band from the forehead, and this leaves their hands and arms free; a great thing when the road, as frequently happens, lies over or round steep faces of rock, with very little foothold, the chief support being obtained from canes and creepers, which the men clutch as they pass along. The Khasias have a peculiar kind of chair which they use for carrying people in, and which we adopted with great advantage for the transport of sick or



Travelling-chair of the Khasias.

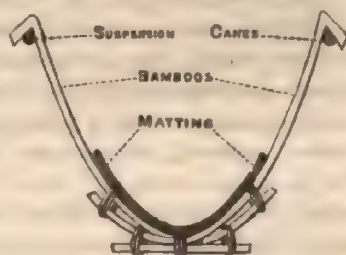
wounded men. It consists of a stout bamboo, about five feet long, which is split up for about two-thirds of its length. The split part is then opened out so as to form a funnel, into the bottom of which is worked a seat; half of the split portions are then cut away, and the rest are worked with cane into a comfortable back to the seat; a small foot-rest is suspended from the seat; and when one is accustomed to it, it is not at all an uncomfortable mode of conveyance. I was

* In our Chitral explorations, Bapu Jadu and I ran nearly 800 miles of traverse with this instrument, and the results were very satisfactory.

once carried thus by two men, turn and turn about, for six weeks, having sprained my ankle badly.

The Khasia coolies brought down from Shillong, where I had left it when I started for Gilgit, a Berthon boat which I had purchased in 1884, in London, for our explorations from Upper Assam to the Irawadi. It is so well known that it is unnecessary for me to describe it here. I need only say that it was the smallest size made, i.e. seven feet long, weighing just a coolie load. One coolie always carried it, with oars complete; and as it only takes two or three minutes to set up, and less to shut up, it was always available. The road from Cachar to Manipur lies across several high parallel ridges separated by deep valleys, through which flow fine fishing streams, the Barak, Irang, &c. Sometimes our day's march brought us to the banks of one of these streams, sometimes we crossed one on the march. In either case I set up my boat and sculled Mr. Ogle, who is no boatman though a fair fisherman, up and down some deep-blue pool lying still between steep dark rocks and the most glorious masses of foliage, while above and below murmured dangerous rapids. Mr. Ogle would trail out a spoon, and was generally very successful, especially in the afternoon, when our coolies were eating the remains of their morning meal previous to making more elaborate arrangements for dinner. Their lunch, if I may so call it, some cold boiled rice, had been carried in plantain (banana) leaves, and the men sitting at the river's edge threw from time to time a leaf into the stream, and as it floated slowly down, fish rose at the grains of rice still adhering to it. As the leaf was carried towards us I would so manoeuvre that Mr. Ogle's spoon with a long line out should pass under this leaf, and it was a certain find; as witness an hour's sport one afternoon: five fish, weighing $2\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$ lbs., an aggregate of 6 lbs. of mahseer.

The bridges across these rivers are peculiar. They are suspension bridges constructed of cane and bamboos. The span is 50 to 60 yards, and the footway from 20 to 30 feet above the river, winter level. The suspension ropes are strongly anchored over, and to, living trees on the banks. There is very little dip, not more than four feet. The section of the bridge is a parabola, with the roadway in the apex. The roadway is matted, the matting being curved up on either side to the height of about three feet, which gives a greater idea of security. Innumerable stays and guys give a certain stability to the structure. Ponies cannot easily pass, and in the winter a small floating bridge gives them passage. In Assam two boats fastened together and covered with a platform make a suitable horseferry-boat; but in conservative and Brahminical Manipur such an innovation could



Section of Suspension Bridge.

not be sanctioned, and when our transport officer, Captain Wilcocks, a smart young fellow, suggested this plan to the Prime Minister, he gravely said, "It would be an offence against the Deity, who would assuredly visit the country with some dire affliction if He saw two boats so unnaturally connected."

We reached Manipur on the 8th December, and spent a few days making arrangements with the Manipur officials for guides and small guards—a matter of time, as something always interfered with business: one day was unpropitious, another day was discovered to be the anniversary of the death of the Maharajah's grandmother, and no public business could be transacted nor amusements allowed. One morning the Maharajah's band came down, at the request of Mr. Primrose, the political agent, and played to us for an hour, and much struck we were with the performance. The bandmen are all young Nagas, trained by a native bandmaster, to whom great credit is due. All these hill-men seem to have good ears, and often my Khasias used to arouse the echoes in the gloomy forest till a very late hour at night with hymns from Moody and Sankey, picked up from the missionaries, or with Bengali melodies, and the effect was very good.

A description of my Manipuri guard may prove amusing, as the guard themselves vastly amused my smart Sawar. They turned out every morning with their heads muffled up in cloths, only their eyes being visible, and their bodies swathed in vast cotton quilts; their weapons were either tied up in a cloth on their backs, or, more frequently, given to a Naga to carry, the only object of their real care and solicitude being their hookah, at which they took a pull every quarter of an hour. It was not, as a rule, till midday that they divested themselves of their bulky coverings. A Manipuri sentry was always posted on my tent at dusk, but I found from observation that as soon as I went to bed, the sentry went to bed also.

The principal object for which we were sent to the Kabu Valley was to survey it carefully with a view to a possible division of it between two rival chiefs; the Tsawbwa of Thaungdut (or Samjok) on the east, and the Tsawbwa of Kalé to the south. It was, however, finally decided to administer the valley ourselves, and so we were saved the tedious work of boundary surveys and were able to turn our attention to the country lying beyond and to extend the triangulation (which had been carried to the borders in 1881-2 by Major Badgeley and Mr. Ogle) right down to below Alôn, whence a junction was effected with the triangulation round Mandalay by Captain Hobday.

We left Manipur on the 13th December, when, having made all arrangements for guides, small Manipuri guards, and supplies, we separated, Mr. Ogle going to Sanaching H.S. (Hill Station) and I to Munci H.S. On the way Mr. Ogle started Bapu Jadu at his work. Mr. Ogle soon had Sanaching, Manchuibung, and Kamong stations

ready, and having observed to them from Munoi, I went on to Tammu via Yangopopi thana. The Kabu is a long narrow valley, flat and open, lying to the west and south-west of Manipur, and in Burmese territory, the boundary here between Manipur and Burma lying along the foot of the hills of the former state; Yangopopi thana, a wretched collection of huts in a rotten stockade, forming one of the frontier out-posts of Manipur. In the Kabu we have another instance of two streams flowing in opposite directions, meeting, and turning off at right angles through a range of hills. The Kabu valley is bounded on the east by a low range called the Angoching, its peaks rising from 2000 to 3000 feet above the sea, the general level of the Kabu being approximately 600 feet. The watershed between the Kabu valley and the stream running to Kalémyo is so very low that looking south from Tammu, it is difficult to believe that there is a watershed there, and this may perhaps have led to the old maps having the name Kabu carried down to Kalémyo.

In the summer of 1886, the political officer at Manipur, Major Trotter, was sent into the Kabu Valley with a view to bringing it ultimately under his administration. He passed through Tammu to Pantha, the next large village, where he was well received and lodged, with Major Hailes and the escort, in a monastery just outside the village stockade. Everything went well till 2 a.m. when they were all suddenly aroused by shots from the village, which was found to be full of dacoits summoned by the head-man of Pantha and the Bishop of the Kabu Valley. Major Trotter was shot in the knee, and died eventually of his wound. The dacoits were beaten off after several hours' fighting, and the village was burned, but our party had to retreat. Major Hailes afterwards returned to Tammu, which was thenceforth held by us. The dacoits erected a stockade at Changnenong, about three miles from Tammu, whence they continually threatened that post. Major Hailes was wounded in a skirmish and had to go into Manipur, and the command devolved on Captain Stevens of the 42nd G.L.I. Things seemed so bad in the autumn of 1886, that Captain Stevens received orders to abandon Tammu and retire into Manipur territory; fortunately he knew how disastrous such a step would be, and feeling sure that he could hold his own, practically disobeyed orders and shortly after attacked and signally routed the enemy, driving them from the Kabu Valley. The Viceroy was so impressed with his conduct in incurring such a fearful responsibility as he did in remaining at Tammu, that he wrote a letter of thanks with his own hand to Captain Stevens.

I reached Tammu on the 21st December, and halted next day to pay up and discharge the Manipuri guard and guides, and fix the position of Tammu. On the 23rd I took the coolies up to a hill, Laiching, about three miles north of Tammu, which afforded a good station, and began to clear it. I was joined here by Mr. Ogle, and on the 25th we returned

to Tammu to eat our Christmas dinner with the officers there—Major Dyce, D.A.A.G. North-east Frontier, Lieutenant Berkeley, 44th Regiment G.L.I., Dr. Younan, and Mr. Mitchell, a young civil engineer in charge of the new cart-road between Manipur and Tammu. General Gordon had gone on to Kendat. On the 28th we again separated, Mr. Ogle returning to Munoi and Laiching to observe, while I went on to Auktaung, where I found Captain Stevens, who arranged for me to go to a high point above Kampa, which I intended to make our next forward station. As I wished to see General Gordon, who was to return on the 2nd January, I employed myself in the meantime in putting up crow's nests in a couple of lofty trees, one at Auktaung, the other on a low range three miles to the east; from these I was able to fix my positions and do some topography. These stations in the trees were necessary, owing to the dead level of the forest, no amount of clearing giving any extensive view.

The General returned on the 3rd, and I had a long talk with him about our work. Nothing had been settled then about the Kabu question, and he and Captain Raikes, Deputy Commissioner, Chindwin, were anxious that our operations should not include clearing some peaks on the Angoching range, where we had hoped to make stations, from which to extend our triangulation eastward. They thought that the suspicions of the Thaungdut Sawbwa would be aroused and that he would mistake our marks for boundary pillars. We eventually got a couple of points lower down on the range out of Thaungdut territory, but our work would have been a little better had we been able to clear the peaks we had first decided on.

As there was no objection to my going to the peak above Kampa, I started on the 4th, reaching the village in the afternoon. It had lately been visited by Chins, who had utterly destroyed it; nothing but a few charred sticks remained of what had been rather a fine village. Dead half-burnt buffaloes lay in unexpected corners, or in the jungle, poisoning the atmosphere, and I was glad to get away next morning. I asked my interpreter how he knew that Chins and not dacoits had burnt the village. He replied, "Oh! because the monastery has been burnt. Had dacoits destroyed the village, being good Buddhists, they would have spared the temples; but the Chins having no religious fears, spare nothing."

The Chins are nearly allied to the Kukis and Lushais, whom they resemble strongly in appearance and habits. They live in the hills bordering the Kabu Valley to the south of Manipur, and raid as far as the Chindwin river, which they never cross, and which receives its name from them. The Chins are afraid of water, into which they never venture to any depth. So afraid of them were the villagers that they told me they never, in the cold weather, slept in the villages at night, but in the jungles, and always in a different spot each night. With the

commencement of the rainy season raiding ceases. A small guard was placed in some of the villages liable to attack; and the Chins were on one occasion taken by surprise, some Gurkhas having arrived just the evening before they attacked. They dreaded Gurkhas very much, having an idea that the Gurkhas are cannibals who eat their enemies. In the Kabu, as elsewhere in these regions, a heavy, white, wet fog settles down during the early morning in all the valleys and over all low-lying ground, and it is impossible to see through it for more than a few yards. It very often does not lift till 10 or 11 a.m. The Chins attack usually in the early morning when this fog is lying low; they wait till the men have gone out to the fields, and then unperceived slip into the village, burn it, and in the resulting confusion kill, and carry off as many as they can.

We did not reach the peak that day, but on the 6th I succeeded in finding it. There was not much clearing to be done, and it turned out an excellent and most useful point. It overlooks the whole of the Kabu Valley on one side, and on the other, Kendat and a long stretch of the Chindwin. To the west the view is bounded by the high Chin ranges, densely covered to the very summits by forest jungle, a few brown patches on one long spur running down into the valley, showing where were the first fields of these dreaded savages. Below, the Kabu lay stretched at our feet, also covered with forest, in which fine teak trees grow side by side with a poor relation called "ing," bearing a strong family resemblance to the teak, but utterly valueless. It was a curious thing that although I was 3000 feet above the valley, very few of the villages or even the somewhat extensive fields were visible, so shut in and swallowed up were they by the tall forest. To the north the view is bounded by the Naga Hills rising ever higher and higher towards Saramethi, but to the east the eye drops suddenly some 8000 feet to the valley of the Chindwin; the country on its left bank being very low, a confused mass of little hills, with one or two isolated and conspicuous peaks on the far horizon.

On the 12th I returned to Tammu, having done all I could in the southern portion of the valley. At Tammu I again picked up Mr. Ogle, who had been doing some good work, and together we went to one of the points on the Angoching range, already alluded to, returning to Tammu on the 17th; on the 18th I took the opportunity of the return of some influential refugees from Kendat to their houses to send Bapu Jadu with them in boats down the Yu river to Kendat. He surveyed the whole of the stream with the subtense instrument and made a valuable addition to our maps. On the 21st Mr. Ogle left for Auktaung to survey the country between that place and Kendat by a road called the Minthami route, and to do some more triangulation.

The 22nd was too wet a day to move, but on the 23rd I started with the General by the Swéja route for Auktaung on the Chindwin, which we reached on the 25th. Here we met Lieut. H. Daly, Political Officer

in charge of the Lekayain district, a very able and zealous young officer, whose headquarters were at Pongbyin, and with him I started for that place.

On the 26th we stopped for the night at a place called Kaia, where we lodged in a very nice little "ziát," or traveller's rest-house, a feature in all Burmese villages. It is generally a prettily carved and very well carpentered room, constructed entirely of wood, raised a few feet from the ground, and opening in front into a spacious verandah. Here cholera broke out among my coolies. Mr. Mitchell had had cholera among his Naga coolies while at work on the Swéja route; we stopped at one of his camps for the night, and must have picked up the disease there.

The first case occurred at 8 p.m., just as we were going to dinner. Mr. Daly sent to the priests, who kindly placed at our disposal one of their small houses adjoining the monastery, in which they kept a bishop's throne and some spare drums; to this we removed the sick man to keep him apart from his fellows; the native doctor and I remained with him till 12, and just as I was going to sleep, a man lying immediately under that portion of the raised floor where my bed was, began to groan. Getting up, I found he also had been seized, and I removed him to the ziát where the other poor fellow was lying. The doctor and I again did what we could till 2 a.m. without success. At 6 a.m. a third man was seized. The first two died in the early morning, the third lingered till the afternoon; a sepoy was also seized in the morning and we sent him up by boat with the sick coolies and the doctor to Pongbyin.

The villagers were again very good in assisting us in burying the dead and in getting boats, &c. All the arrangements for the dead and sick delayed us, and as we had a long march of 23 miles, a good deal of it through slush and mud, we did not get in till late. The next day we halted to let the native doctor join us and to rest the coolies.

Pongbyin is a largish village on the Chindwin, 70 miles above Kendat, and on the opposite bank is a large marsh and lake where wild fowl of all kinds literally swarm. Subadar Hema Chand, of the 44th G.L.I., stationed at Pongbyin, used frequently to go out for a couple of hours of an afternoon and return with a couple of geese and six or seven ducks of various kinds, not to mention snipe and such small game. He is a great shot either with gun or rifle; and, somewhat rare for a native, brings down birds on the wing as easily as when sitting.

On the 29th, Mr. Daly and I, with a guard of 50 men of the 44th under Hema Chand, started on a trip to the Uyu river; we marched up to Homalin by land, returning by river in boats, paying a short visit to the Tsawbwa of Thaungdut on our way down. He was very friendly and said we might explore any part of his dominions.

During our trip we saw some gold-washing. Small channels conduct water into a wooden tank sunk in the ground. The gravel containing

gold-dust is brought down in baskets from the low hills near, and the heavier stones are sifted out with a bamboo sieve; the finer portion is then put into a circular wooden vanelling vessel and held over the tank; water is then poured over and the vanelling carried on till only the gold-dust remains; the residuum is a fine black heavy sand containing iron.

On our return to Pongbyin on the 7th, we found that the place had been attacked by Chins two days previously and part of the village burned before the garrison, under Captain Boileau, succeeded in driving them off. My Berthon boat proved most useful on the Chindwin. I sculled myself nearly the whole of the 70 miles between Homalin and Pongbyin, and I was able to explore small creeks on the way, and, going ahead, could look about for good plane-table stations before the heavier boat, in which were my *khalásis* and plane-table, came up, and thus saved time. I had intended after this trip to have gone down to Kendat, but rumours of dacoits being in the neighbourhood induced Mr. Daly to organise two more little excursions eastward in the hope of catching some of them; and although we were disappointed in this, I was enabled to do a good deal of work. I finally reached Kendat on the 27th February, where I found Mr. Ogle, who had made all arrangements for commencing the triangulation of the Chindwin.

On the 1st March, Mr. Ogle went down with Bapu Jadu to a point we had fixed a few miles down the river, and pointed out the hills ahead which the *bábu* was to clear; and on the 2nd, having got all his men and boats together and a guard of the 18th B.L.I., he started off down stream, while Mr. Ogle went back to the station on the Minthami route to observe some necessary angles. Till the 6th I was employed at office-work with the writer, and in advising about the curtailment of the stockade, which was far too large for the garrison intended to be left there.

On the 6th March I left with Colonel Toker and Captain Raikes in a steam launch for Mingin, in which district a rebellion had just occurred, and there seemed a chance of being able to move about with the troops. However, this rebellion had collapsed, and the leader, Budayaza, had been captured before we reached Mingin, and so I returned with Captain Raikes to Kaléwa. Thence he despatched messengers with presents to the Tsawbwa of Kalé, whom he had been trying for some time to induce to make his submission. The message was to the effect that he and I, being now in the neighbourhood, would pay him a visit, if agreeable to him.

In consequence of the disturbances in the Mingin district, the Kendat authorities had recalled Bapu Jadu, and finding that both he and Mr. Ogle were detained idling at Kendat, I asked Captain Raikes to employ the few days we had to wait for the answer from Kalé in taking me up to Kendat and starting the triangulation again. This, with his usual readiness to oblige, he agreed to, and once more work was resumed.

It was now getting very hot and all the hill-sides were wreathed in flames from jungle fires, the smoke from which rendered the atmosphere very dense, and greatly hindered our work henceforth.

As I have said, the country to the east of the Chindwin above and about Kendat consists of a confused mass of low hills, or table-lands, intersected by numerous ravines and water-courses, and enclosing flat cultivated valleys. The only possible way of surveying this country is to traverse the small streams and village paths. These hills and plateaux seldom attain a height of 500 feet above the general level of the plain, and are all of such a uniform elevation that it is of no use to make clearings for plane-table work. Below Kaléwa, also, the country through which the Chindwin flows is so low, or broken up into such a confusion of low hills, that little or no topography could be done from any of our trigonometrical stations, and military considerations prevented our leaving the river banks for any distance. The forest on these low hills is very light and open—a few stunted and scantily foliaged trees, with little or no undergrowth.

Kaléwa is very prettily situated on an elevated tongue of land, between the Myittha and the Chindwin, at their junction, and is the port for the Kalé country. The one street of the village runs along the ridge, gradually rising to a commanding eminence crowned with numerous graceful pagodas, shrines, and *siáts*. Here the sepoys lived, and I also had a *siát* to dwell in—a nice airy building overhanging the river which flows far below. The whole of the platform is of brick, and formed a perfectly firm foundation for the theodolite in taking observations for latitude, and here I obtained the best results. Each pagoda spire is crowned with the usual *hti*, or gilt umbrella, with nine small bells attached to each; at night, when a gentle breeze plays over the hill, the air is full of sweet sound, which rises and falls with beautiful effect. Often I lay awake at night listening with pleasure to these innumerable fairy tinklings high overhead, which mingled with my dreams when at last I slept. Around Kaléwa rise high peaks sloping to the south and east, but falling in abrupt precipices to the north, and at night we could see the jungle fires creeping like snakes in long undulating lines up these steep slopes. I asked Captain Raikes' Burmese servant how these fires originated. He said, "At this time of the year the ground is covered with dead leaves and dry grass, rocks roll from above on to others below and strike sparks which set light to the inflammable dry vegetation." We were inclined to pooh-pooh this explanation at first, but further questioning of other entirely independent witnesses always elicited the same reply.

When we went up to Kendat I had left instructions with my *chaprassi*, Jhanu, to go up to a conspicuous point about three miles from Kaléwa and 2400 feet above it, and put up a mark; on my return I found he had not done so. He had started with some sepoys with the

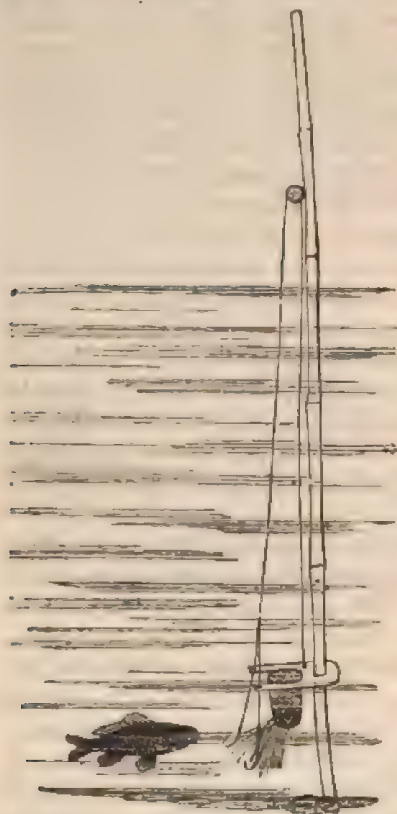
intention of getting up, but the day was hot and the climb was a stiff one, and the guide took them by an unnecessarily roundabout route, probably from not clearly understanding where he was wanted to go.

The sepoys were disgusted at having to climb hills, being principally long Pandis of the 18th, and they dawdled and sat down frequently, saying they were not built to climb hills, and when Jhanu remonstrated and said if I had been there they would have been up in half the time, they replied irreverently, "Bosh! is he a bird to fly up this confounded hill?" And so Jhanu came back with his work undone. I therefore, on the night of our return to Kaléwa, requested the *subadár* commanding our 18th escort, a very nice gentlemanly man, to pick me out a few good walkers, and we started next day at daybreak; crossing the Myittha took us some time, and we left the opposite bank at 7 a.m. It was intensely hot, the slopes were very steep and covered with dry leaves and grass, slippery to a degree. The range is quite precipitous to the north, and slopes at an average of 40° to the south, the ridge being a mere knife-edge, barely wide enough for foothold; indeed, where we put up the mark we could not keep a footing till a little earth platform had been built up. We reached the top at 8.45, and flashed down to Kaléwa, to the intense astonishment of the sepoys who had gone with Jhanu. An idea of the steepness of the hill-side may be formed when I say that when I had my lunch a hole had to be dug for me to sit in and smaller ones for my heels, my feet being further supported by a log pegged up below them. I got the mark up and returned to Kaléwa in the evening.

The next day an answer came back from the Tsawbwa to the effect that raids by China, which were frequent just then, kept him at Indin, his temporary capital, and so he could not come to Kaléwa, but he should be delighted to see Captain Raikes at Indin if he would take the trouble to go so far; so we made all arrangements to start on the 15th March. I had my Berthon boat with me, and it was the delight and admiration of all the Burmese. At Kendat and Kaléwa I frequently went out for a scull in the evening, and there were always several naked little urchins on the bank waiting for me, and when the boat was launched they stepped in after me with as much calmness as if it was the regular ferry-boat. Their confidence in me and my boat was highly gratifying. On the 15th we started, the whole party in boats, for Indin. On the way up we passed one or two villages which had been lately looted and burnt by the Chins, in dread of whom the villagers build huts on piles in mid-stream, or roof over boats lashed together in pairs and moored far out in the river; and to these temporary abodes they retire at night, as Chins have a dread of water, as before mentioned.

In all river scenery in Upper Burma the new comer is struck by every here and there meeting with a little forest of tall bamboos rising

out of the water, with a black reel attached near the top of each pole. On inquiry he learns that these are fishing stations, the method of catching fish being as follows:—A small basket about six inches deep is suspended from the top of the pole by a piece of cane; to the brim of the basket is fixed a U-shaped stick, the ends of which are split. The bamboo pole passes through the loop of the U and the basket is thus held to the bamboo, but allowed movement with the current of the stream; a reel



Fish-trap.

with a line ending in two strong cords, carrying a hook each, is fixed to the pole above water, and the split ends of the U receive the cords and hooks. These hang just below and in front of the basket, which is weighted with stones and contains packets of pounded rice in leaves, and hangs near the bottom of the river. The action of the current keeps the basket in motion, shaking out the powdered rice, which the fish come to eat, and not seeing the unbaited hooks in the issuing cloud, get caught. Their tugs pull the hooks away from the split sticks holding them, and their struggles are indicated by the eccentric movements of the portion of the bamboo holding the reel above the surface, to a boatman waiting near.

About three miles above Kaléwa is a large outcrop of coal, a seam of about 10 feet thick, of which a good deal had been taken out for the steamers plying on the Chindwin. The bank had been undermined, and further excava-

tions were dangerous and had been stopped for the time when we passed up. I made a careful survey of the river as we went along.

We reached Indin on the afternoon of the 17th, and landed at a point about three miles off, whence a path to Indin cut off a great bend of the river; and here the Tsawbwa met us in great state with a procession of girls carrying vases of flowers on their heads, musicians, dancing girls, matchlock men, and spearmen, and personal attendants bearing a gold umbrella over him. He mounted us on two elephants with funny little howdahs, with only space in each for one person, and conducted us in

state to Indin, where we were installed in a very fine and commodious priest's house (Poongyi Kyoung).

The next few days were spent by Captain Raikes in bringing his negotiations with the Tsawbwa to a satisfactory conclusion. At first nervous and suspicious, the latter soon acquired confidence in our good faith, and became quite friendly. One day I visited a curious limestone hill about seven miles off and got a good view of the valley; and from this and other points around Indin I managed to secure a good deal of topography, though jungle fires and thick haze prevented my doing as much as I should have liked and could otherwise have done. While at Indin, my time was spent after dinner in taking stars for latitude, and Captain Raikes kindly assisted me greatly both then and on other occasions by recording for me. We were fortunate in meeting some influential Chin chiefs while we were there, and they had a long interview with Captain Raikes, in which they agreed to use their influence in putting down raiding on the Tsawbwa's territory. (The Chins raided in April last and carried off this Tsawbwa from Indin, with other captives.) We left Indin on the 22nd, well pleased with our visit, and reached Kaléwa on the 23rd. On the 27th we steamed down to Mingin, and on the way we saw Mr. Ogle's camp, and anchored. He came on board for an hour and reported progress. I was very sorry to find he had been suffering from a bad attack of fever for a few days, but was recovering, and had got on well with the work. On the 28th Captain Raikes very kindly sent the steam-launch up to Mr. Ogle; and this enabled him to finish his work, as far as Mingin, by the 30th, when he joined us.

On the 1st of April we took Bapu Jadu up to a point suitable for a station, and left him to clear it, and pointed out some hills ahead, which we wished him to clear, and then started in the steam-launch, which thenceforward was at our disposal, to go up the river again to observe from all the stations which Mr. Ogle and the sub-surveyor had been putting up. We managed it in this way: there was no room in the launch for us to sleep comfortably, so we took the outer fly of Mr. Ogle's tent, which was large enough to afford us both shelter, and was very quickly pitched on the bank at night and as quickly struck in the morning. At dawn we rose, got our few traps on board, and started for the nearest station, having *chhota hazri** on board. I deposited Mr. Ogle and his party on the bank at the landing-place for his station, and went on to mine, sending the launch back when I had landed. As soon as Mr. Ogle finished his work, he signalled to me, and I could then guess the time he would take to rejoin me; we then went on together. Sometimes, though rarely, we could visit two stations each during the day, but generally three altogether were all we could manage.

We got back to Mingin on the 6th, and waited a few days hoping to

* *Chhota hazri* = little breakfast, the early cup of tea.

see the sub-surveyor's onward marks; we saw one, but could not make out any clearings on the highest range. Mr. Ogle therefore started on the 10th to put things right. He returned on the 14th, and on the 15th and 16th we observed at stations near Mingin. On the 14th April we received the first letters we had had since 5th March, owing to confusion resulting from our postal line being changed from *viâ* Manipur to *viâ* Mandalay.

On the 17th news came that a new steamer going down the river between Mingin and Alôn had run aground, and it was doubtful whether our launch might not be wanted to assist the steamer. Our departure was therefore delayed a little, but we were able to start on the 18th, and observing at several stations on the way, reached Alôn on the 21st, where we halted for one day to bring up arrears of correspondence, and then returned up the river observing. All our work above Alôn was finished by the end of April, only a few points remained south and east which the sub-surveyor cleared. At Alôn we lived on board a steamer, as accommodation was limited in the small bamboo-walled hut which did duty for quarters and mess-house for the officers of the garrison. It had been very hot for some time past, the thermometer going up to 104°-106° in the shade frequently during the day. The anchorage was not as salubrious as it might have been, and the result was that I got a touch of fever in the first week in May.

I was very anxious to visit Lepadaung H.S. to pick up some points I had previously observed to, and I went down one morning when I ought to have stayed in bed; we had a long walk across a barren stony plain, and up a ravine where the breathless atmosphere was like a furnace, finishing up by a very steep climb of 700 feet. With Mr. Ogle's assistance, I finished the observations and got back to the steam launch, but I had to go to bed on my return to Alôn, and was on my back till the 24th, i. e. nearly three weeks. I was moved up on the 15th to the officers' barracks, Captain Sage very kindly giving up his little room to me, and all the officers, from Colonel Toker downwards, did what they could for me. The resources of the place were limited, there was no ice, no soda water, no champagne, the commissariat bread was almost uneatable, and I lived on tea and indifferent soup for three weeks. During this time Mr. Ogle was very busy visiting Chaukkah twice, having been disappointed by the weather of seeing all he wanted on his first visit. Some heavy storms having cleared the atmosphere he was more successful on the second trip. At last on the 24th May, a steamer came and took us all to Mingyan, where Captain Hobday met me. Mr. Ogle and I left for Mandalay on the 26th in the mail steamer, and there, thanks to the kind care of General Sir G. White and Captain Hobday, I rapidly recovered strength, and after a fortnight's stay we proceeded down to Rangoon. We left Rangoon on the 22nd June and reached Calcutta on the 25th, and Shillong on the 17th July.

The results of our work are as follows:—an area of 2800 square miles was triangulated; a portion of the Manipur Valley (860 square miles) was surveyed on the 1 inch = 2 mile scale; the whole of the Kabu Valley, and a large portion of the Lekayain district, comprising an area of 3924 square miles; and an accurate map obtained of the Chindwin river between the Uyu river and Monywa below Alôn.

After the paper,

Captain E. W. DUN (Deputy Quartermaster-General, Indian Intelligence Department) submitted the following notes on the paper, which were read to the meeting. He said that though he had travelled in the country described by Colonel Woodthorpe, north of Manipur and east of Samaguting, he could add little to the information given by so experienced and observant a traveller. He would venture to make a few remarks, the result of observations made while he was employed in charge of the Intelligence Branch in Burma, on a subject which then forced itself on his attention and might make an appropriate appendix to Colonel Woodthorpe's paper. The subject is, the systematic collection of geographical information about as yet unvisited countries. The subject has had an attraction for many distinguished men, and he might perhaps be permitted to instance Colonel Yule as the greatest compiler of information of this character. When he entered Burma, in November 1885, Colonel Yule's map of Upper Burma was our sole guide to the northern portion, and without it we should have been absolutely at sea. He was placed in charge of the Intelligence Branch at Mandalay in February 1886. In March it became evident that Burma was very far from being conquered, and that numerous expeditions would have to be despatched from Mandalay in all directions. He was directed to supply information on which generals could frame their combinations, and from which the Commissariat could calculate the requirements of columns. At this time the Survey Department was not represented in Burma, nor would there have been time to make surveys. In these straits he turned to native information, and soon found that the Burmans possessed (comparatively speaking) admirable maps, many of them drawn roughly to scale. As the royal collection had been inadvertently destroyed, these maps had to be sought for among the private copies of former governors of districts. This was an operation of some delicacy, as many of these men naturally hated us, and a sort of reign of terror existed which prevented the well-disposed from being seen in converse with British officials. Many and various were the artifices which had to be employed, and most picturesque and strange the circumstances under which the maps were obtained among the ruined nobles of the Burmese court. This, however, only lent a zest to the undertaking, and by the time Major Hobday of the Indian Survey Department arrived, native maps of almost the whole of the valley of the Irawadi had been collected. Major Hobday now supplied fixed points, and the joint result of their labours was a map comprising 7° of latitude and 4° of longitude, which, though far from accurate, was found to be useful and eagerly sought after. As the work progressed, much assistance was obtained from route surveys by military officers, but the main point he wished to bring to notice was the practical value of the native information collected.

In the following year the same system was applied to more distant portions of Burma—the Shan States, the Singpho country between Bhamo and the Uyu river, where the great Endawgyi Lake and the Jade quarries are situated, Wuntho territory, which is an independent Shan State, and the Yaw country. On the information then collected, five columns of troops were moved distances varying from 200 to 600 miles each. These columns were supplied with food and transport

to carry them through their journeys, on calculations based on the native information collected, and their movements were timed to allow of junction with one another, and of their withdrawal from unhealthy localities before the rains set in. Operations were extended the following season, and several columns are now being moved on the native information collected last summer. The most popular and reliable plan of arriving at this information was, he found, to have a space of ground dug up to the depth of one foot and to get natives who had travelled in the part of the country he wished to inquire about to construct thereon a relief map. He had a piece of ground near a Shan caravanserai, in a shady garden where the traders were glad to rest, talk, and drink tea, and they constructed a relief map of the whole of the Burmese Shan States. Their scale was a day's march to a notched stick, and though the method was rough and unscientific, the results proved useful. An experiment has thus been made on a sufficiently large scale which proves that native information, when carefully collected, sifted, and compared, can be made of considerable practical value; and travellers who are delayed (as is frequently the case) by want of transport, political obstruction, &c., on the threshold of the field of their labours, will not find their time wasted if they try and get a relief map as above described constructed. Savages will take a childish pleasure in work of this kind, when half-an-hour's questioning will make them thoroughly weary and out of temper. The whole of Southern Tibet, Western China, and the country occupied by the Shan races, which covers a much larger area than is at present generally believed, could be thus mapped out by persons stationed at such trade centres as Darjiling, Dibrugarh, Batang, Tali-fu, Bhamo, Luang-Prabang, and Zimme. Both the Burmese and Shans have a wonderful aptitude for map-drawing, which it is probable the Tibetans share. Chinese maps he had found very puzzling, but all along the frontiers of this vast region much valuable information might be collected.

Captain Dun added that he regretted that he had no Burmese or Siamese maps to show to the meeting. They were very curious and amusing.

Letters from Mr. F. C. Selous on his Journeys to the Kafukwe River, and on the Upper Zambesi.

Map, p. 260.

WE received from Mr. Selous, in February, another valuable map, illustrating the journeys he undertook north of the Zambesi and in the Barotse country, after his return from Mashuna Land, his map of which was published in the 'Proceedings' for May 1888. After sending the map and the following letters, he decided on returning to England, and arrived in time to revise his map for publication.

BANKS OF THE ZAMBESI, Oct. 10, 1888.

I left Panda-ma-Tenka on June 5th, 1888, with sixteen pack donkeys and about twenty-five porters, with the intention of crossing the Zambesi at Wankie's, and then following the northern bank to the mouth of the Kafukwe, as I did in 1877.* From there I intended to strike north, through the Manica country, and, if possible, reach the Garenganze country,† west of Lake Bangweolo, where elephants are said to be very

* Vide 'Proceedings R.G.S.' 1881, p. 169.

† See Mr. Arnot's paper and map in the 'Proceedings,' ante, p. 65.

plentiful, and where I hoped to make a successful hunt, and obtain a good quantity of ivory. However, I failed most dismally to carry out my intentions. In the first place the Batongas along the Zambesi, who in 1877 were particularly friendly, are now very extortionate, not to say dangerous, having murdered and robbed several white men of late years. In one place they stood all round us with poised assegais, and were very threatening.

Upon reaching Shamedza's—a Batonga headman a few miles south of Mwemba's—I resolved to leave the Zambesi, and make my way on to the plateau lying between that river and the Kafukwe, and then cross the latter and strike north. I obtained guides from Shamedza to the Zongwe, and there got others who took me on to the plateau.

The country through which I travelled, between the Zambesi and the high country, was a most difficult one for donkeys, being a mass of steep hills, stony, rough, and barren to a degree. Water was also very scarce in these barren hills, but became more plentiful and the hills more rounded and covered with forest, as we left the Zambesi further behind us and neared the plateau. I found the same forest trees and the same species of butterflies on the wooded hills lying just under the plateau that one meets with on the northern and eastern slopes of the Mashuna country, at a height of about 3500 feet, from which I infer that the high plateau itself, lying between the Zambesi and the Kafukwe rivers, must be over 4000 feet above sea-level. Once on the high country travelling was easy. Game and water were both plentiful, the temperature cool and pleasant by day and very cold at nights. In a few days we struck the fountain or eye of the Ma-goi-ee river (marked Makoe in Mr. Ravenstein's map), and after following it for a few miles, made for the little hill of U-kesa-kesa (marked Kesi-kesi in Mr. Ravenstein's map), and from there to Monze's. When Dr. Livingstone visited this chief in 1853, Monze was living close to the hill of U-kesa-kesa, but his village is now about eight or nine miles to the north-east. He remembered Dr. Livingstone's visit quite well, and spoke of it as if it had taken place last year instead of thirty-five years ago. He said he had never seen another white man since.

From Monze I obtained guides to take me to the Kafukwe. We again crossed the Ma-goi-ee, and afterwards the Ungwesi, which we followed to close to its junction with the Ma-goi-ee. On Mr. Ravenstein's map this river Ungwesi is marked as running into the Kafukwe. I made careful inquiries of the Mashukulumbwe living on its banks, and I am convinced that the Ungwesi that I crossed, and which is a tributary of the Ma-goi-ee, is the same river which Dr. Livingstone crossed higher up on his journey between Monze's and Semalembue, and that it does not run into the Kafukwe, but into the Ma-goi-ee.

On the 7th of July we reached Minenga's, a Mashukulumbwe chief and found ourselves in a district thickly populated by these savages

The men are all perfectly stark naked, and not one of them ever leaves his hut without a bundle of long throwing javelins, all of them horribly barbed. Minenga's is on the Ma-goi-ee, and about five miles from the Kafukwe, as far as I could judge from what the natives told us of the distance. We could see the fires burning in the reeds of the Kafukwe, so it could not have been very far.

It was here that this little journey of mine came to a sudden termination. On the 8th of July I remained at Minenga's at his request, to drink beer, and I also went out and shot for him two zebras and a hartebeest, giving him all the meat, and he and all his people were apparently very friendly, and the next morning he had promised to give me one of his own sons to take me through the Kafukwe. It would be out of place to give you a full account of what followed, and, moreover, I have sent a detailed account of the disaster to the *Field* newspaper. Suffice it to say that about nine o'clock that night the Mashukulumbwe, aided, as we afterwards found out, by some rebel Marotse, made a most treacherous attack upon my camp. They crept up to our scherm, and fired a volley through us first; this was the work of the Marotse, who alone had guns, but it was immediately followed by a shower of barbed assegais from the Mashukulumbwe, who then rushed in amongst us in swarms. Twelve of my people were killed and five more wounded out of about twenty-five, but this I only found out some time afterwards. Every one who escaped did so alone, and got off in the darkness of the night. I escaped unwounded, as did also my two Dutch-speaking boys—a Zulu named Paul, and one Charley, though we did not meet till long afterwards. I had my rifle, but only four cartridges in my belt; for I may here say that just before the attack we got an inkling that something was wrong, by one of our guides from Monze's finding out that all the women had left the town. I had then turned in, but on hearing the news at once dressed again and put on my cartridge belt, which, as I had been shooting that morning, was nearly empty. I had my rifle in my hand, though unloaded, and was just going to get out some cartridges when the attack was made.

After getting clear of the camp I hung about for a long time trying to find one or more of my boys, but unsuccessfully, and so had to start on my return journey to Panda-ma-Tenka alone. I first had to swim across the Ma-goi-ee, here deep and full of crocodiles, and then walked during the rest of the night through a country full of lions. The next afternoon I shot a wildebeest, and after broiling myself some meat, shouldered as much as I could carry and continued my journey. That night I again narrowly escaped being murdered. I incautiously entered a village near Monze's, where I thought the people would be friendly, but I was suffering so from the cold that I could not resist the temptation to warm myself at the fire that was burning in the middle of the village. It was after midnight, but I roused some of the people, and they did

not seem unfriendly, and I lay down by the fire and went to sleep. Aroused by some men coming to the fire, I sat up and turned towards them, my rifle lying behind me. As I did so a man rushed in behind me, seized the rifle and made off with it, and at the same time one of those sitting by the fire threw a bundle of grass upon the embers, which immediately blazed up with a bright light, and by this light I saw a fellow sitting under the thatch of a hut not ten yards from me, taking aim at me with an old musket. I did not wait for him to get his shot off, but was through the fence and outside the kraal again in a very brief space of time.

After this I had no more danger, but a good deal of hardship, and gradually made my way down to the Zambesi valley again, passing not far from Chiribwe (Thaba Chen). At Shankopi's town I rejoined the remnant of my party, fourteen days after the attack on my camp, and we then recrossed the Zambesi at Wankies, and from there walked to Panda-ma-Tenka in three days. I had been three weeks without a blanket, and that is no joke in the middle of the cold season out here, and had certainly not lived on the fat of the land; however, I was in good health.

Of course I lost everything I had with me, including four valuable breech-loading rifles, and sixteen donkeys, and a lot of goods, ammunition, &c., altogether not less than 400*l.* worth of property. My journal, maps, compass, &c., were of course lost too. I had made a very careful sketch map from Wankie's to Minenga's, taking compass bearings wherever I could, and fortunately had a rough copy of my route in my pocket when I escaped from the Mashukulumbwe. In the sketch map I send you, I have squared my route on to Mr. Ravenstein's map between the Zongwe and Monze's. By my dead reckoning and compass bearings, I made the distance five miles less, and got Monze's further to the east. The sketch map of my return journey past Chiribwe is of course very rough, as I had no compass, and no pocket-book to take daily notes.

The Zongwe river is called Morongo Mineni on its central course, and Mozuma near its source as marked in Mr. Ravenstein's map, and every river in this part of Africa has several names along its course. The Batongas on the Zambesi told me that the river Sengwe enters the Zambesi from the south as I have marked it, near Kisi-kiri's (not Misigeli's as Mr. Ravenstein has it). Both on the Zambesi, and on the plateau between the Zambesi and the Kafukwe, the Batongas call themselves Batongas, never Batokas, which latter word is a Makololo corruption of the right name. The Mashukulumbwe are very nearly allied to the Batongas. They speak a dialect of the same language, and knock out the four front teeth of the upper jaw in the same way as the latter tribe.

On August 12th, I again crossed the Zambesi at Kazungula, where the Chobe or Kwando joins the great river, and travelled to Lialui in

the Barotsé valley. This is a journey of no difficulty, and of very little interest, and I only send you the sketch map of my route because it does not agree with the German map published in 1885, and as I had men with me well acquainted with the country, you may rely upon the names of the rivers, as marked by me, being correct. Mr. Coillard, a French Protestant Missionary, who with Mrs. Coillard is now living at Sefula in the Barotsé valley, has made a waggon road right up to Lialui, and this road I followed to near the N'joko river, where I left it to the east, and again joined it near the Mutondo. The Loanja is a swamp rather than a river, and its waters do not reach the Zambesi except in the rainy season, but come to an end as I have marked it. The Majili is a stream of the same description; a large river containing great reed beds in which hippopotami are numerous on its upper course, it dwindles to a few small pools, at some distance from one another, before reaching the Kasaia. The Kasaia is a small deep river, and does not come from a long distance. The Ungwesi does not run into the Zambesi as it is marked in the latest maps, but above Mambova as I have marked it. It is a wretched little stream near the Zambesi, but a large river like the Majili higher up. My boy Charley, who has been brought up at Panda-ma-Tenka by one of Mr. Westbeech's half-caste elephant hunters, knows the upper course of the Ungwesi well and also has been to the sources of both the Majili and Marobetsi rivers, and in fact knows the whole of that part of the country thoroughly.

The country on the Upper Majili is inhabited by the Monkwia tribe. The Barotsé valley is a miserable part of the country, and about the best place to get fever in that I know of. I had a sharp attack there myself, as well as Charley and Paul and several of my boys from Wankie's. I was very well received by the chief Liwanika, and also met with much kindness from Mr. and Mrs. Coillard. I took three horses with me to the Barotsé, sold them all to Liwanika for ivory, and returned to Kazungula by canoe. On the way down the river my canoe was attacked and sunk by a hippopotamus in about 12 feet of water. We got the canoe up again, but I lost everything I had with me (including a fine tusk of ivory), except a waterproof bag containing my blankets (and luckily my journal and sketch map) and my cooking pot, which both floated to the top. Everything else remained at the bottom of the Zambesi: provisions, cartridges, trading goods, and all a traveller's little odds and ends. My butterfly-net too, and a collection of butterflies I had made for Mr. Trimen of the Cape Town Museum were lost. The lid of my pot serves me now for a plate, and my fingers and pocket-knife for fork and spoon.

In coming down the Zambesi, I was very careful to note where all its tributaries joined it from the east (there are none from the west), and also marked all the rapids. The mouths of the rivers are so small that unless one has men who know the country and can point them out, it is

very easy to miss them, as the Zambesi itself is very broad and full of wooded islands. I have put the names also to *all* the rapids of any importance. In the German map of 1885, it is stated that according to Dr. Holub there are forty-five rapids between Nambwe and Katima Molilo. The river may have been lower when the Doctor was there than when I came down it, but I cannot understand how there can be as many as he says there are. I took down the names of all that I passed. Nambwe is the only one where the canoes have to be dragged out of the river. Sekhosi and Katongo are the same place (Katongo being the name of the town, and Sekhosi of its former chief). From Sinanga to Sekhosi's the scenery of the Zambesi is very pleasing, but does not rise above the pretty. It is in the same style as the scenery of the upper Thames, but the English river bears the palm. The Falls of Gonye are well worth seeing, if you happen to be near them, though of course very very inferior to the magnificent Victoria Falls. Immediately below the falls, the river, running in a gorge often not more than 100 yards broad, turns sharply to the south-east, and does not run to the west as marked in the German map.

I met Mr. Percy Reid at Kazungula, and got from him a small compass, with which I took my direction in going with the horses to Lialui, and I walked with the Kafirs the whole way and timed myself with my watch. I allowed three geographical miles an hour to the foremost Kafirs, when the path was good and there was no stoppage or delay. In the sketch map I send you I have given you the actual distance I made it from Sesheke to Lialui; as I am only about three miles wrong, if Major Serpa Pinto has placed the latitude of Lialui correctly. Whether you will have patience to read through this long letter, I think is very doubtful, but I will now bring it to a close.

P.S.—In my sketch map I have given the names of all the tributaries of the Matetsi river, that one crosses between Panda-ma-Tenka and Wankie's. They do not agree with Mr. Baines's names of many years ago, but I am sure they are the names by which the rivers are known at the present day. I have yet to compile the map, from my different little route maps, and this I will do immediately upon my return to Panda-ma-Tenka, where I have some good tracing paper and also red ink. It will be on the scale of Mr. Ravenstein's map. My first journey to near the Kafukwe was through country the general features of which are more or less known through Dr. Livingstone's early explorations, so that I am afraid that that portion of my map will be of very little use or interest to you. For the second portion, showing my route to the Barotsé valley, please remember that the French missionary, Mr. Coillard, is the pioneer of this route, and that I followed his waggon road for a considerable portion of the distance. As, however, he has made no map of his travels, I do not think that I am wronging him in sending

you my sketch map of what he may perhaps consider to be his road. The Majili, Marobetsi, and Ramaroba rivers, I have marked according to information obtained from Charley (my boy) and some of Mr. West-beech's half-caste elephant hunters. I think that I have got them pretty correctly sketched in, in a rough way. They, together with the N'joko, Lumbi, and Lui rivers, all rise in what they describe as a high, rather open and healthy country, inhabited by Monkwas and Masasas.

PANDA-MA-TENKA, Nov. 13, 1888.

I ought now to be well on my way to Mangwato (Shoshong), but no rain has as yet fallen, and I am stuck up here, and am in much the same state of mind as the famous Dutch skipper (subsequently the commander of the phantom ship), when prevented by contrary winds from getting round the Cape of Good Hope. This is the more annoying, as I want to get down to the Transvaal, refit, and get back here as quickly as possible, as I intend going to the Barotsé with my waggon next year, and from there making a journey on foot further north. Since concluding my last journey, I have been down to the Victoria Falls again to pass away the time, and have compiled my map; and I now write you this supplementary letter to tell you that on Mr. Ravenstein's map the positions of Panda-ma-Tenka and of the Victoria Falls cannot both be correct.* By compass the Falls are very much to the east of north from Panda-ma-Tenka, and must be to the east of true north. Then as Panda-ma-Tenka stands on Mr. Ravenstein's map, the road from there to the junction of the Chobe and Zambesi bends much more to the west than it really does, and the distance to Wankie's is much less than it actually is. I have therefore taken the liberty to move Panda-ma-Tenka further west than it is placed on Mr. Ravenstein's map, and I cannot but think that I have now got the four positions of Kazungula, Victoria Falls, Wankie's, and Panda-ma-Tenka relatively pretty correct, though they may all be actually wrong. I have timed all my routes carefully by the watch; from Panda-ma-Tenka to Kazungula, to Victoria Falls, and to Wankie's, and as I have now placed Panda-ma-Tenka, I get my distances in very nicely. The distance, to Wankie's from Panda-ma-Tenka cannot be less than I have made it, and may be more, and I believe that some day it will be found that Wankie's is further west than it is placed on the maps. Why I say so is because all the natives living at the Falls, and who are constantly in the habit of going down to Wankie's to buy hoes, tobacco, &c., say that from the Falls to the river Ungwesi is as far as from the Falls to Kazungula, and that from the

* In preparing Mr. Selous' map, Mr. Turner found that by adopting the position of Daka marked by Baines, due south of the Victoria Falls, and the distance and bearing of Panda-ma-Tenka from Daka as given by Serpa Pinto, the location of Panda-ma-Tenka coincides almost exactly with that given by Mr. Selous, as also with Dr. Holub's position.—[Ed.]

Ungwesi to Wankie's is further than from the Falls to Ungwesi. However, from Ungwesi to Wankie's the road is not so good as from the Falls to Ungwesi, so I have marked that river (called Kalomo on its upper course) as entering the Zambesi, half-way between the Falls and Wankie's. The natives sleep four nights on the road from the Falls to Wankie's, and get there early the fifth day; and two nights on the road from the Falls to Kazungula, and get there early the third day, and they follow well-beaten footpaths to either place. From here the Bushmen point to Wankie's very little to the north of east by compass, and I have found that they usually—when well acquainted with the country—point very correctly. These details, however, will only weary you, but they may be useful to Mr. Ravenstein, if he ever compiles another map.

Do you know that Mr. George Westbeech is dead? I saw him here last June; he was then on his way to Klerksdorp. He was worn out with fever, and died in the Transvaal before reaching his destination. That is the end of every one who remains long in the terrible climate of this part of Africa. If I live through next year I shall come home, though I do not know what I am to do for a living in England.

F. C. SELOUS.

H. W. BATES, Esq.,
Assist.-Sec. B.G.S.

P.S.—You will see that it only took me three days to walk from Wankie's to here. But it was on my return from the Mashukulumbwe, and as I was in good walking condition and in a great hurry I walked at a furious pace, on the third day leaving all the Kafirs behind but four, and they did not get in until the next day. None of them carried anything at all, and you know what good walkers natives are. What I mean is that three days is not the usual time in which the distance is done. Five days is the ordinary time. The verdict of Mr. Westbeech's hunters is that from Panda-ma-Tenka to Kazungula is one-third less than the distance from Panda-ma-Tenka to Wankie's. I walked from Wankie's to Panda-ma-Tenka in 25 hours by the watch, and from Kazungula to Panda-ma-Tenka in 17 hours 30 minutes. But this is very fast walking. It will, however, give an idea of the relative distances, as the pace was about the same in each, and I took the time very carefully by watch.

Formosa: Characteristic Traits of the Island and its Aboriginal Inhabitants.

By GEORGE TAYLOR, Imperial Chinese Customs Service.*

IN the year 1881, when Sir Robert Hart, Inspector-General of the Chinese Imperial Maritime Customs, directed the engineers of his staff to proceed with the erection of a lighthouse on the South Cape of Formosa, it was found that new and peculiar difficulties, quite outside the ordinary range of experience, had to be met and overcome. The land approaches to the headland were through ravines and passes, populated by the most feared tribe of aborigines in Formosa, the Southern Paiwans, whose headhunting propensities and general unamenableness were notorious. They had successfully baffled the most talented of the Chinese officials; force, guile, and bribes had been in turn tried without any lasting effect; the lives and property of strangers remained unsafe, and murders of Chinese woodcutters were so common as to attract little notice. The surrounding district offered at a cursory view little attraction to Chinese settlers, being mountainous and generally unsuitable for rice cultivation; therefore it may be safely assumed that, unless the necessity for a lighthouse had arisen, South Formosa would have remained in the sole possession of the seemingly inhospitable aborigines who hunted over it. Besides barring the overland paths, the most hostile and implacable community of the tribe, the Koa-luts, claimed South Cape as their own especial fishing ground, and it was only after the most delicate and tedious negotiations with the chiefs direct, that the Chinese Customs succeeded in buying the ground where South Cape lighthouse now stands. Thus the absence of quarrels or bloodshed helped to foster the feeling of mutual friendship and confidence, which, generated at the beginning, continues to exist between those at the station and the aborigines.

When approaching Formosa, during clear weather, one can easily trace the bold outline of the mountain range which ascending from north and south culminates in Mount Morrison and Mount Sylvia, each over 12,000 feet above sea-level. From the central ridge the descent to the east is abrupt and precipitous, in other directions the slope is more gradual.

The nature of the country prevents the formation of any river of magnitude—the only one of importance as a means of intercommunication being the Tamsui river in the north, which is navigable only to flat-bottomed boats of little draught. During the rainy season great torrents rush through the valleys, and for a short period creeks and channels, at other times dry, become fierce streams, which the natives

* A brief abstract of this paper was read to the Geographical Section of the British Association at Bath, in Sept. last.

take advantage of to convey their heavier produce towards the coast. Sometimes unwary travellers are caught when crossing a ravine and swept away, a heavy rainfall on the mountains often flooding a valley, although over the valley itself the sky may be bright and clear.

The Chinese have completely ousted the aborigines from the fertile and highly cultivated plains which line the west coast, and the same may be said of the extreme north; even in the south and in sheltered nooks up the east coast, where little rivulets favour the cultivation of rice, the Chinese squatter and family will be found patiently and perseveringly trimming and extending their paddy fields. This example leads many of the aborigines to abandon their wilder habits and compete with the Chinese as agriculturists; thus the whole coast is lined with a comparatively peaceful, industrious, and law abiding people; those of the aborigines who retain their lawless habits being forced inland among the mountains, and only on occasion making excursions to the coast.

On the western side of Formosa the land is composed of low level plains, extending from the sea-shore to some distance into the interior, the country appearing flat up to the more pronounced elevations which precede the steeper mountain slopes. The splendid watershed from the central mountains shows in the numerous rivulets which spread like a network over the plains, and renders them especially suitable for the cultivation of rice and sugar-cane. The western seaboard partakes of the nature of the land, the coast being lined with mud and sandbanks intersected by channels, this formation extending some distance out to sea.

Northern Formosa is comparatively hilly, but large areas are covered with tea plantations, which form the principal industry.

The east coast is rugged, precipitous, and exposed to the full fury of the north-east monsoon, which blows hard throughout eight months of the year, therefore, except in the Pilam plain and a few small valleys, little attempt is made at cultivation.

To the south the land terminates in huge masses of coral limestone, and coral branches may be traced in peaks elevated 2000 feet above sea-level. The sea-shore is lined with a semi-vitrified conglomeration of clay, sand, and coral, which presents a serrated surface so sharp and ragged, as to be impassable to all beasts, and the natives when fishing are obliged to protect their feet with sandals composed of many folds of boar-skin.

Keelung in the north and Takow on the west are the only harbours in Formosa. Two or three steamers, even of the larger class, can ride in Keelung, but Takow is available only to vessels of light draught. Takow, however, offers more natural advantages, and, if dredged, would make a capital land-locked refuge for a considerable number of vessels. There are also several creeks on the west coast where small native craft

can enter, and Taiwanfoo roadstead, Liang-kai Bay, Expedition Bay, and the bays between the promontories of South Cape and South-west Cape, afford good anchorage to vessels during the north-east monsoon. In the south-west monsoon, however, when it blows hard, Formosa can hardly be approached; even in Keelung the heavy swell renders the harbour unsafe. The east coast is completely without shelter in either monsoon; but at two places harbours might be formed by blasting away obstructions which exist at the entrance to small creeks; still these creeks could only be entered in fine weather.

Excepting those parts under cultivation, the whole island is densely wooded. Camphor trees are abundant, especially in the north. In the central parts there are forests of pine, and some of the mountain sides are covered with stunted fir. Wild fig-trees are abundant, also banyans, ebony, and other forest trees. Pandanus or screw-pine is found everywhere, and the more shrubby parts are interspersed with lofty screw-palms. Guava bushes grow near the coast, and the plum, peach, orange, and other fruit trees are indigenous, and are conserved by both Chinese and aborigines. The low valleys teem with the luxuriance which distinguishes the tropics, while the higher levels exhibit the hardy vegetation of more temperate climes, and up on the mountain tops little nooks are reached, where flowers and grasses usually found only in the colder latitudes may be seen growing.

In winter the summits of the higher mountains are often capped with snow, and in summer the wind, when blowing off the mountains, tempers the heat, and renders the nights refreshingly cool. The temperature of South Formosa is remarkably low for 21° lat. The summer heat seldom raises the thermometer above 90° F. in the shade by day, and about 86° at night. In winter the thermometer will fall to 50° . On the whole the climate is good, provided one lives on somewhat elevated ground.

Apart from the plains lining the western coast, Formosa is a land of precipitous mountains and rugged ravines, possessing from an agricultural point of view little value, but when its mineral wealth is considered, a great future may be predicted for the island. Coal is plentiful everywhere, and iron often lies in close proximity to it. At some place in the interior a kind of coal is found, so bituminous that the natives make torches of it. Sulphur beds are numerous. Mineral oil is found, and wells have been sunk which under prudent management might have yielded handsome profits. In some districts inflammable gases are ejected, and burn fiercely when ignited. At the bases of some of the higher mountains traces of copper ore have been found, and although not generally known, it is a fact that gold exists in Formosa. Rubies have been noticed among the natives, and no doubt there are other precious stones. Pieces of coarse amber are sometimes picked up on the sea-shore. The interior has never been explored by specialists; only two Europeans

have penetrated any distance into savage territory, and theirs was a hurried survey; yet the mineral possibilities of Formosa seemed boundless.

The aborigines of Formosa cultivated barley, millet, buckwheat, hemp, flax, tobacco, sweet potatoes, yams, and taro. After the advent of the Chinese barley lost the place it held as the staple grain and rice became the favourite cereal.

The pure aborigine from the interior is unquestionably Malayan in his character, language, and habits; yet among communities lying close together the most extraordinary diversity in features prevails. One tribe may resemble the Malays more, another will have a Hindoo type of face, while a third might be almost Italian. There are traces in their lore, games, and common sayings of a like diversity having at one time prevailed in their language; scraps of doggerel and rhyming numerals may be heard repeated by the children, and the old people will tell that long long ago their fathers spoke this tongue. There is no trace of the aborigines of Formosa having ever been combined under one ruler or king; their traditions are all of distinct tribes.

Strangers appear to have reached Formosa at different periods and settled at points on the coast, their descendants as a rule remaining distinct from the Malayan aborigines.

Those inhabitants of Formosa who have so preceded the Chinese, and others who in point of priority of arrival in the island are entitled to be termed aborigines, may be divided into four divisions--the Paiwans, Amias, Tipuns, and Pepohoans.

The Paiwans, as far as can be ascertained, are the earliest settlers in Formosa. The majority inhabit the inaccessible mountains of the interior. They are cruel, predatory, passionate, and easily excited, and when excited care for nothing. Head-hunting prevails more or less in all their communities. Among some tribes a warrior need look for little favour with the fair sex unless he possesses a skull or two as trophies of his valour. Among others heads are used as public offerings at seed-time and harvest; and yet others bury the heads, erecting over each a small stone tablet; each year a counting of tablets takes place, and the village possessing the most is awarded a handsome prize. The Paiwans say that in the beginning a rock burst open and two beings, male and female, came forth, from whom they are descended. Their ideas of an after state are confused and vague, their heaven being in some mountains towards the north.

The tribes who live near those mountains tell strange tales of the sights seen and noises heard there. They relate that, when any great chieftain dies, his name may be heard called aloud as the hosts of ghostly heroes whirl to and fro, hurrying in the eagerness of their welcome like the rush of a mighty tempest. Sometimes a solitary individual threading his tortuous way through the mountains shrinks within himself in

terror, as invisible hunters, encouraging their wild hounds with weird shouts, sweep past in ceaseless pursuit of phantom deer.

Traces exist of a belief in a purgatory or transmigratory state, souls expiating sins by a season of uncongenial environment—certain of the more docile animals are exempted from slaughter on this account—but a place of eternal punishment is considered impossible, as the spirits would get tired of it and return. The Paiwan of the mountains is, as a rule, a robust individual, being tall, fine limbed, and active. The women are small in stature, but symmetrical. All are of a bright copper complexion, and without that dusky tinge which characterises the negro race. The hair is black and straight. Some tribes cut it short across the brows and longer at the back, others allow it to grow to its natural length and then wear it coiled on the head. All traces of beard are carefully plucked out. The face is broad and the cheek-bones prominent. Their eyes are full and open, but have a curious glassy glare; the nose is of all shapes and sizes, from the aquiline to the flat. Their usual dress consists of two aprons, one before and one behind; in cold weather this is supplemented by deer-skin jackets. The great vice of the Paiwan is drunkenness. Those who can afford it are hardly ever sober. Arrack destroyed the once powerful confederation of the southern Paiwans. Their greatest chief, Tokitok, drank himself to death twenty years ago, three successors did likewise, and the fourth is an imbecile from the same cause. The chiefs, subsisting as they do on a modicum of the fruits of the labour of each warrior of their tribes, are comparatively affluent, and can afford to be habitual drunkards. The people have a superstitious reverence for their hereditary chiefs, and when those failed them, became demoralised, each community concerning itself only with its own immediate affairs.

The Tipuns, another division of the aborigines, appear to have been the next arrivals in Formosa. They have distinct traditions of their having come from some other land, and speak of an immigration of several families forming a small community. To imply a Japanese origin because of the similarity between Tipun and Nipun might be considered a rather forced deduction, but the Tipuns are certainly from some northern islands. The creek, now hardly distinguishable, is pointed out where the first families landed, and the locality where the first houses were built is held sacred. Even the bamboo fencing still grows around the little green plots, which show among the trees, covering the gentle slope of the hill. The place is much revered, and annual sacrifices are offered up here on the sites of their ancestors' homes. No one is allowed to cut wood or fire a gun near the place, and the Chinese officials have upheld this rule. Several Chinese who have attempted to cut wood have been struck dead, by the spirits say the Tipuns, but shot down by the savages would be nearer the truth.

The Tipuns are of rather smaller stature than the Paiwans, have

softer features, and are inclined to be fleshy and not so sharp and angular as their neighbours. The Paiwans and Tipuns have so merged into one another, each adopting his neighbour's most useful traits, that the original manners and customs of the Tipuns are nearly lost. A few distinctions still remain however. The chiefs of the Tipuns and their families are tattooed, principally around the wrists and on the backs of the hands and fingers. To be tattooed is a mark of gentle blood, as the practice is strictly forbidden to the commonalty. When a man marries he becomes part of the wife's family, thus reversing the rule which prevails among the Paiwans. Instead of the two aprons they wear leggings, waist-cloths, and long overcoats of buff skin. On great occasions the chiefs wear robes of tapestry work of a beautiful geometrical pattern.

As a rule the Tipuns are agricultural, hunting and fishing holding a second place. Intermarriage between them and the Chinese settlers is common. The Chinese officials consider them the most amenable people in Formosa. The Tipuns work in iron and silver, both metals having been received from abroad as far as their traditions extend back. By all accounts they must have been a semi-civilised people when they first arrived in Formosa. They still retain a language of their own, but also speak the Paiwan dialect. For a long time and up till the Chinese took steps for the more thorough subjugation of the aborigines, the Tipuns ruled over all South Formosa, and Tipun chiefs were sent out to act as headmen in the more remote Paiwan villages. Soon after landing at Pilam, the Tipuns either conquered or absorbed the existing community of aborigines, and by this means became supreme on the east coast; the village of Pilam being considered the capital of East Formosa. Here, at one time, a supreme chief or king actually held court, and when he went out was attended by the flower of the eight cities. But the confederation is now completely dissolved. The first great break was the revolt of the southern Paiwans. The King of Pilam having banished some of his family for their misdeeds, they went south and stirred the Paiwans into rebellion. At the present day the ruling family of the southern Paiwans is directly descended from those exiled princes.

The Amias, the next division of aborigines, are a most interesting people. By Chinese and other outsiders they are classed among the aborigines, but the other aboriginal tribes look upon them as foreigners. Some subdivisions of the Amias trace their common descent from a being who planted a staff, which as it grew became a bamboo; from the bamboo sprouted two shoots, which in due time developed into two beings, male and female. Their offspring multiplied and occupied Kowahsan, near Pilam, which to this day is regarded as the mother city. Other aborigines have it that the Amias are the descendants of the crew of a large vessel wrecked on the coast. The crew were allowed to live and intermarry with the natives, on the understanding that they

and their posterity were for ever to consider themselves an alien race, subservient to the true aborigines.

The Amias are now too strong to hold themselves at the bidding of chiefs of other tribes, yet a fiction of suzerainty and subjugation still prevails; the Amias never considering themselves entitled to rank socially on terms of equality with the other savages. At all festive gatherings, where tribes are mixed, Amias must wait until the others are served. They differ in personal appearance from their neighbours, being hirsute and of better developed muscular powers. In manners and customs they also differ. They alone hold a new year, celebrating it at the end of their autumn harvest. The Amias have a tradition that at one time they possessed a written character, but the most careful searching and examination has failed to bring to light any trace of truly aboriginal manuscript.

The Pepohoans, the fourth division, hold much the same position between the Chinese and aborigines as the French Creole families do in New Orleans. Pepohoan is a Chinese appellation, meaning savages of the plains, or foreigners of the plain. It is probable that the Pepohoans were originally emigrants from the Loo-choo Islands. Nothing is more likely than that such an industrious agricultural people as the Loo-choo islanders should elect to settle in those parts of Formosa most suitable for cultivation. All half-castes attach themselves to the Pepohoans, and this people resemble the Chinese more, and always support a higher civilisation. The aborigines state that ages before Chinese rule was established in Formosa, Chinese and others, including "red-haired men," traded between Formosa and the west. Many sailors deserted their vessels, and ships were frequently wrecked. Runaways, and those who survived shipwreck, intermarried with the aborigines, but their offspring joined the Pepohoans. One Pepohoan relates that his grandfather and granduncle were natives of Calabar, and formed part of the crew of a large vessel commanded by "white men," which was wrecked on the east coast of Formosa. The crew were all massacred except the two brothers, whose piteous appeals for mercy drew the attention of the chief, to whom some of their exclamations appeared intelligible. Considering the men must be of a kindred race to his own, he gave them their lives, and they chose wives from among the aborigines; their children, however, joined the Pepohoans.

The simplicity of the Pepohoans is proverbial, and they and their possessions fell a ready prey to the more astute Chinese from the mainland, who managed to obtain possession of the greater part of the lands the Pepohoans had reclaimed. The Chinese have a popular anecdote, which relates how two Pepohoans had together become the proud possessors of three dollars, but could not devise a means of dividing them equally. They sat down on the road, and each took a dollar, but still there remained another; how to dispose of it fairly was a poser.

At length a Chinaman came along, and they asked him to solve the problem, which the Chinaman did, by giving each one, and pocketing the third, leaving the Pepohoans lost in amazement and delight at this ready solution of their difficulty.

The Pepohoans never have been head-hunters, neither do they resort to arms except for defensive purposes. At the present day they are fast becoming amalgamated with the Chinese, and it is wonderful how soon those of the aborigines who forsake their old ways, become even more astute than the Chinese, and soon cease to show any distinctive traits. The Chinese have a proverb, to the effect, that, when the savages take to wearing trousers, there is no opening left for a Chinaman.

The island of Botel Tobago, 80 miles south-east from Formosa, is inhabited by a race closely resembling the Formosan Amias. Chinese sailors say that copper ore has been found on this island. The natives breed pigs and poultry, and an islet called Little Tobago is full of goats, whose many coloured coats have called forth the admiration of Europeans and Chinese. The natives call them *kàtri*, and this is sufficiently like the Portuguese term to warrant the supposition that their progenitors were presented to the islanders by the earlier Portuguese navigators.

Throughout Formosa the manners and customs of the aborigines are on the whole much alike.

Among them is a custom which is also found in Central Africa. In each village there are one or more buildings called *palangkans*, which are large houses built to accommodate the youths of the village from the time they attain puberty until married. Their food is prepared by the parents and taken to the palangkan, the young lads never being allowed to reside in the paternal home. In their leisure moments the boys work here at basket-making, joinering, tailoring, or any other craft they may have a taste for. All public matters are discussed in the palangkan, and it also partakes of the nature of a caravanserai, as any visitor may enter, hang up his belongings, and begin cooking at the public fire. By day the building is watched by the youths in turn, and it often happens that one may find a village totally deserted, all being out among the fields except the boy who drowsily nods in the door of the palangkan. On the receipt of any intelligence necessitating a meeting of the villagers, the watchers attach to their waists the iron bells which always hang at the door, and run through the village, regulating their speed by the importance of the matter to be discussed.

The tribes of the interior quarrel and fight on the slightest provocation. As a rule their fighting is done in the bush. If one tribe sends out a hunting party, another tribe equips an expedition to intercept it, or one fishing party plunders another; but if the quarrel continues for some time, and relations become so embittered that agricultural work or fishing is brought to a standstill, the opposing parties appoint a day and

place, and fight a pitched battle. About nightfall each side counts its killed and wounded, and the one that has the most declares itself vanquished, and indemnifies the victors. Amicable intercourse follows, and the matter is considered at an end.

The marriage customs are somewhat peculiar. The young men go courting, and when one has in due course obtained the consent of his particular choice, he forthwith proceeds to carry a bucket of water and a bundle of firewood, which he places before the fair one's door. When the parents are agreeable, the water and the wood are taken in; but if the reverse, they are allowed to stand. When parents are unwilling, the young men try to propitiate them by presents; and if they still remain obdurate, he persuades the girl to elope with him. The parents cannot prevent or punish them, as all are free to marry whom they please, unless the chief decrees otherwise. Among some tribes the husband joins the wife's family; in others the wife joins the husband's.

The head of a house holds everything in trust for the mutual benefit of the whole family. Succession, as a rule, is in the direct male line, but if an elder son proves dissipated or disobedient, the father can appoint another son or a nephew to be his successor.

The Paiwans sew their dead in a buffalo skin, and bury them in a spot near the dwelling, tabooed to all except members of the family. The grave is lined with stones, and after the clothes, arms, and ornaments of the deceased are laid therein, the corpse is set in a sitting posture inside, facing towards the nearest high mountains. The "chist" is covered with a stone slab, and the grave is filled up and turfed over. Although its particular place may be forgotten, sacrifices are made once a year in the burying ground, to the manes of all the departed. The Tipuns dispose of their dead similarly to the Paiwans, only the graves are inside their dwellings. The Amias carry their dead to graves dug in waste land, and bury them facing the west. After the grave has been filled up and the small slab of wood erected, each man as he moves away flings a handful of earth at the wood and spits on it, repeating a formula to the effect that the deceased must be contented and stay where he may have gone to; that during his declining years he had been well treated, regardless of trouble, so that he must not think of returning, particularly he must understand that if he does, the spitting and stoning just performed is a sample of what his reception will be.

The Paiwans do not concern themselves about natural phenomena, but the Amias believe that thunder and lightning are the result of a quarrel between two spirits, husband and wife. The former, finding domestic arrangements unsatisfactory, begins tumbling the household furniture about, this noise is heard as thunder. His wife finding words insufficient for defence or retaliation, uncovers herself, hence the lightning. When an Amia female uncovers herself she is supposed to express the utmost degree of scorn and contempt. Earthquakes they

account for as being caused by an immense pig scratching itself against an iron bar stuck into the earth.

There is no limit to aboriginal superstition; they live in an atmosphere of omens, witchcraft, and goblins. Any inexplicable occurrence is put down as the work of some malicious spirit trying to entrap the unwary. Goblins emerge from dark caverns in the forests and cause famine, sickness, and death. They will relate how so-and-so's wife's brother's cousin, when gathering turmeric, saw grinning imps peeping out from the cane-brake, and that that same year small-pox carried off 200 men of the tribe.

Any one hearing a sneeze must at once return, no matter how near one may be to the end of one's journey, sneezing being considered of all omens the most unlucky. Even inside a building, if one happens to sneeze the rest mumble a charm. The call of a certain bird if heard on the left presages fatal misfortunes, and the hearer must turn back. If one sees an armadillo by daylight it is unlucky, but if one touches it, then prepare for a sudden death. Death also follows careless handling of the sacred bead *pulatsoo*.* The touching of a neighbour's meal, *girnel*, is followed by inflammation of the eyes, and total blindness can only be averted by ceaseless sacrificing. A neighbour's corn is similarly protected. One who has unpleasant dreams must confine himself to his house for the day. If your dog howls at night secure the services of a priestess, else there will soon be a death in the family. The crowing of a cock just at sunset is an evil omen; the bird must at once be taken to where roads cross and killed. The clucking of a hen at night is also unlucky. If an echo is raised, then great winds and heavy rains will follow; therefore high cliffs and hollowed precipices must be passed in silence, for there dwell the spirits of departed chiefs, and the grounds near are their fields and gardens, which must not be encroached upon. Before liquor is partaken of, a few drops must first be sprinkled on the ground to refresh the spirits of departed ancestors. All are afraid of ghosts; women will on no account venture out after nightfall, while young men consider it a test of courage to pass the night in the woods alone.

Their folk-lore consists principally of narrations of fabulous encounters and feats of prowess, wherein the actors may be either men against beasts, beasts with beasts, or men pitted against each other. Thus the bear is credited as being endowed with extraordinary sagacity and cunning, and is not to be lightly encountered. A leopard is supposed to be able to carry off a buffalo by twisting his tail around it; therefore it behoves one to be careful of this animal. The bulong snake

* *Pulatsoo* is a bead formed out of very fine clay, and is much used by priestesses in their divinations. Strings of these beads are worn by the chiefs and head priestesses, but to others the wearing of them is forbidden. A tiara of *pulatsoos* forms the crown of the supreme chief of the southern Paiwans. The chief wears this crown only once in his lifetime, on the day of his accession. Rubies have been noticed mixed up among the *pulatsoos*; in fact, it is believed that the original *pulatsoos* were rubies.

is supposed to be imbued with a spirit of eternal enmity towards mankind, which accounts for its bite being usually fatal.

From their folk-lore one anecdote may be culled as a good illustration of the tales with which they beguile the dreary evenings of the rainy season. A white land-crab and a monkey became sworn brothers. At night both assumed human shape. The crab was perfect, but the monkey could not rid himself of his tail, which he had always great difficulty in keeping hid. (The full dress of a Formosa savage is a short apron before and behind.) Near where they abode in the daytime, while in their natural shapes, a pretty girl carrying water was in the habit of passing. Both animals were smitten, and at night visited her as two sprightly young men. One day the crab proposed that, in order to make themselves irresistible, they should go to a certain place and pluck enough of a particular berry to make circlets for their heads. The monkey assented. As the crab could not climb the monkey went up and threw down the berries, which the crab was to gather up; instead of doing so, his greed overcame him, and he ate them as fast as they fell, until the monkey, astonished at the crab still replying that the quantity was not yet sufficient, came down. He at once saw what his friend had been doing, and the two began mutual recriminations. The crab, at the same time, knowing he was no match for the monkey, kept carefully backing towards a small crevice; and when the monkey in a climax of rage made a dash at him, he quietly withdrew from reach, leaving his assailant to cool down as best he might. As it was getting dark the monkey hastened to assume the human form and visit the fair maiden. When on their amorous visitations the monkey always sat on the edge of the large rice-mortar; the crab, remembering this, determined to revenge himself, and before the monkey arrived was snugly drawn together on the bottom of his companion's wonted seat. The pretended youth entered, took his usual seat, and began a flirtation, but the crab, crawling up, reached for the tail coiled up under the rear apron, and viciously nipped it. With a howl the impostor jumped up, displaying to the astonished gaze of the maiden and household fully a yard of hairy tail, with a crab dangling at its extremity. Of course he was driven away in scorn, and the crab, with a feeling of great contentment, sidled off to its nest.

Snake wounds are treated by professional suckers whose services are usually successful; the bite of the bulong snake, however, is so often fatal in spite of their endeavours to suck out the poison, that an extraordinary expedient is resorted to to second their efforts. When a man is bitten by a bulong snake, the vicinity is searched and the first specimen found is tied up near the sufferer. If the man dies—as is nearly always the case—the snake is roasted to death; if, however, the suction arrests the poison and he recovers, the snake is released.

It is worthy of note that the habitations of the more peaceful of the aboriginal tribes are far superior to those of the more predatory. At

South Cape, the Koaluts—who, although jealous of interlopers, seldom cross their own boundaries—build houses which are marvels of neatness. The framework is of bamboo adjusted with great nicety, and over this a thatchwork of straw is plaited and bound in by ornamental work in cane. At Tiersock, the principal village of the southern Paiwans, the houses are built of sun-dried bricks and thatched. About three feet from the wall runs an outer skin of split bamboo. The space between, besides being utilised as a lobby communicating with the several apartments, also keeps the rain off the inner wall and allows the air to circulate between, making the rooms at all times cool and dry. The coast Paiwans are most cleanly in their habits. All culinary utensils are washed and scrubbed with sand every morning. It is delightful to see them at breakfast with their wooden rice buckets and platters all well scoured and the iron hooping polished bright. Their spoons are made out of large pearly shells. The Tipuns and Amias, of Central Formosa, are hardly so well housed and cleanly. A Tipun selects a goodly-sized tree which acts as a main post, and around this he erects an irregular-shaped building undivided by partitions. The branches of the tree spreading over the habitation shelter the dwelling underneath. Tables are unknown, as also spoons, each squats on a little billet of wood and dips his hand into the common dish. Yet the Tipuns and Amias are cleanly compared with the Paiwan of the central hills. His usual habitation is a hole dug in the side of a hill, roofed and fronted with slabs of slate; when this becomes untenable through filth and vermin he digs another hole.

The fishing and agricultural aborigines on the coast live in villages, the houses of which are much scattered, and no attempt is made at surrounding the hamlets with a wall or stockade. The Paiwans of the interior, however, also the Tipuns and Amias near Pilam, build their houses close together on some spot which offers natural facilities for defence, and the village is besides surrounded with, first, an inner wall, and then a stockade of trees planted closely together, and wattled with live bamboo. The approaches are as a rule through narrow passes, and immense logs are always lying ready to throw across the gateways. The principal village of the Botans (a Paiwan sub-tribe) is built on the top of a mountain 4000 feet above sea-level, and at the top of the precipitous ascent lie piled a heap of logs and stones, to be dashed down on any foe who might attempt to storm the place.

There are a few lakes here and there in the interior of Formosa, but none of any magnitude. In the extreme south a small river flows from the Liang-oan Lake to Liang-kiau Bay, and this river throughout its course, was formerly navigable to small craft drawing about four feet of water. Half-way between the lake and the sea, the Chinese built the district city of Heng-chun, intending to utilise the river as a means of intercommunication. When the city was completed Chinese settlers

poured in, and the grassy plain soon became transformed into countless paddy fields, with the result that so much of the water was drained from the river for irrigating purposes, that the river silted up at its mouth, and even in the rainy season there is not sufficient flooding to wash this bar away, as the numerous dams and other impediments raised by the Chinese in connection with their system of irrigation, obstruct and divert that direct rush of water, which in former days swept uninterruptedly through the valley. Both in Formosa and on the mainland of China the irrigation of rice-fields has proved injurious to several existing creeks and harbours, but another and more powerful agency, that of upheaval—has also had much to do with the obliteration of the many creeks, estuaries, and bays, which aboriginal tradition points to, as having existed on the coast. When the Chinese pirate Koxinga expelled the Dutch from Formosa, Anping was an island, now it is part of the mainland.

Near where the little river of Liang-oan, already noticed, flows into Liang-kiau Bay, stands a hill known to the Chinese as Ku-soa (it is marked Bay Hill on charts of Formosa). This hill and the little peninsula on which it stands, are connected with the surrounding highlands by a strip of low sand-mounds, and would appear to have been at one time an island. Its commanding position must have commended it as a desirable place from which to guard the landings both of Liang-kiau Creek on the east and Expedition Bay on the south. Numerous ruins, broken pottery, a huge water-cistern of brick, and plants foreign to the locality, attest the natural hypothesis that at a former date some adventurers dwelt there. The Chinese say that one of Koxinga's lieutenants occupied the place, and that the cutting down for fuel of the trees in the surrounding plain allowed the sandy soil to drift into the little channel between the hills and the mainland; but weighty as this statement is, a gradual upheaval appears to have had more to do with the altered state of Anping and Bay Hill than any drift or silting up, and the almost entire disappearance of the creeks and bays on the east coast where some of the aborigines say their forefathers dwelt and where strange ships anchored and traded, can only be accounted for by upheaval. At Tang-kang, a place some 20 miles south of Takow, a small estuary exists where native craft enter, but in the river itself bamboo rafts can scarcely pass along, yet this hardly could have been the case formerly, as traces are evident of Tang-kang river having at one time been navigable to sea-going craft of some size. In a winding inland valley of Formosa, which in former days might have formed the bed of an upper reach of this river, some Hakka squatters erected their wattled huts and in due course proceeded to dig a well. After reaching a depth of about 15 feet, they came on a layer of dark soil, among which was mixed much broken pottery; five feet farther down they found an old wooden anchor of goodly size, and attached to that some length of

coil cable. The place in question is over 20 miles inland, and at one time in all probability the Tang-kang river must have been navigable to this point, and here no doubt stood a prosperous village.

Long ago the aborigines had a peculiar currency. They ground down the convoluted curl which formed the circular base of a conical shell, until it became a flat disc, showing a regular spiral line, and this was held as denominating certain values according to its size. In the more inaccessible parts these discs are still current, and even on the coast the sub-tribes annually present their superior chief with a few, as a token of fealty.

Before tea was introduced by the Chinese the natives drank largely of an infusion of dried citron-peel. This infusion is yet drunk to allay the thirst caused by fever, and another infusion from a root having astringent qualities is considered a specific for glandular swellings.

The coast Paiwans accuse their brethren of the interior of cannibalism, more especially a certain tribe known as the Diaramocks, and relate how when the celebrated Tokitok—whose Napoleonic ambition was to be the ruler of all Formosa—was negotiating with the different tribes and trying to form a confederation, he visited, among others, a chief of the Diaramocks, whom he invited to a conference to be held on the plain. The chief came, and was treated to the best of everything. In return, he invited Tokitok to visit the headquarters of the Diaramocks, and Tokitok went alone. He was well received and introduced to the family, among whom he noticed a nice stout boy, the chief's third son. A little afterwards, to Tokitok's great horror, he saw the chief deliberately cut the boy's throat and proceed to disembowel him. He rushed out and asked the cause. The chief looked at him in surprise, and gave him to understand that he was not to be outdone in the materials of a feast; as Tokitok's people had treated their guest so well, the Diaramocks, in return, were bound to place on the table the best they could produce, adding that Tokitok would find the boy as good eating even as a pig. Tokitok retired, and when unseen decamped with all possible speed, and he never again could be persuaded to visit the Diaramocks. At the present day, however, it is not generally supposed that any of the tribes indulge in cannibalism.

Traditions among the aborigines point to Formosa having possessed a trade with the outside world, long before the advent of Chinese rule; and if aboriginal tales are to be credited, those traders of olden time were particularly hazy in their perceptions when *meum* and *tuum* had to be considered. The Koaluts tell that once, when all the younger men were absent on a fishing expedition, a large ship anchored in the bay and sent ashore a party who, attracted to the village by the grunting of pigs and crowing of cocks, wantonly slew the old men and young children, fired the village, and carried off to their ships some females they captured and everything in the way of eatables they found. The

Koaluts rebuilt their village on an elevated plateau some distance inland, but to this day the rearing of pigs or poultry is forbidden, and so keen is the memory of this event, that, wishing to see their village, I have several times hinted in vain for an invitation from the chief, although we were on terms of close friendship. Other tribes tell of foreign vessels landing parties of men who captured people and carried them to their ships, nothing having ever been heard of them afterwards. After a time the villages were removed from the coast to hidden nooks behind the mountains, and it was the spirit of reprisal more than innate ferocity, which led to the merciless slaughter of those unfortunates who survived shipwreck only to meet a more cruel death ashore.

To the botanist and geologist Formosa must offer a new and wide field. The flora is extensive and would well repay exploration. The deep chasms and precipitous ravines of the mountain ranges lay bare the various formations in a way certain to delight a geologist; the mind of the ordinary wayfarer being drawn to wonder how immense must have been the convulsions that jumbled together within such circumscribed areas the odd combinations which exist; for slate, coral, and coal may all be found within a radius of about 500 yards.

Formosa, combining as it does the animal life of the tropics with that of more temperate climes, is also worthy of the naturalist's attention. In the fauna deer take a prominent place. At one time all parts of the island teemed with them; they could be seen feeding on the plains like flocks of sheep. The influx of Chinese has driven them from the coast line, but they are yet plentiful in the interior. Bears and leopards are often seen; a few wolves also exist, and the skins of wild cats are sold on the coast. The monkey is found everywhere, also the wild pig, the hunting of the latter being the most exciting of native sports. The most glorious of deaths is to be killed in the endeavour to capture, by claspings, a wounded boar. A ring of young hunters will form around the thicket in which one of these animals, perhaps badly wounded, has taken refuge, and narrowing the circle, compel the boar to break cover; the animal attempts to dash through; but none of the young hunters give way, they rather press closer on, and happy is the young warrior over whom the boar tries to rush; regardless of consequences he throws himself on the animal, claspings him where he can with hands and knees, while the others rush in, and with their knives quickly despatch the brute. Sometimes hunters receive fearful wounds, none ever escape altogether, and to at least one-fourth the result is fatal; but they laugh at any attempt to dissuade them. "Will not his name be remembered in the songs of the tribe?" say they. In addition to hares, squirrels, and polecats, there are many other small quadrupeds I have been unable to identify. Game abounds. Pheasants of several varieties, partridges, quail, pigeon, woodcock, snipe, and plover offer splendid sport at all seasons, and in winter the

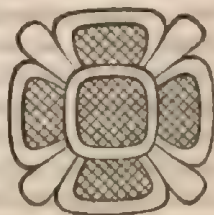
lakes are covered with widgeon, mallard, and teal. The whole interior of the island may truly be called a sportsman's paradise.

A landscape of lofty mountain and winding valleys, where grassy glades of brightest green peep out among the dense woods, relieving their sombre hue; torrents which, forming on the mountains, discharge themselves in cascades of refreshing coolness into the ravines; chasms which rend precipitous ridges; geysers and hot springs; sulphur bogs and gas wells, and the many other features of interest which claim attention as one passes through, fully recompense the traveller, and make manifest the intuitive perception of the early Portuguese, who so aptly named the island "Formosa."

GEOGRAPHICAL NOTES.

Geographical Prizes to Training Colleges.—The Royal Geographical Society's prizes have been awarded this year by the examiners of the Education Department to the following students in Training Colleges, who have most distinguished themselves in the Geographical section of the Examination:—Male students (Scholarship 15*l.*) Alexander Gow, Borough Road College; Prizes (Books) Thomas H. Coad, Borough Road College, Fred Barraclough, Borough Road College, Amos A. Brayley, Borough Road College, Thomas Goodall, York College, and William Halliwell, Chester College (the last four equal).—Female students (Scholarship 15*l.*) Emily Mahon, Chichester College; Prizes (Books) Frances Calver, Lincoln College, Elizabeth Mann, Stockwell College, Jessie W. Gibb, Edge Hill College, Helen Woolcott, Darlington College, and Rose Martell, Salisbury College (the last three equal).

Mr. A. P. Maudslay's Fourth Expedition to Central America.—Mr. Maudslay writes from Merida (Yucatan) on the 31st December last:—"This is a new country to me, and does not promise very well for my Archæological work. The people have suddenly become inconveniently rich, and the cost of everything has increased enormously. This is owing to the rise in the price of Sisal hemp (*Henequen*, the fibre of a species of *Agave*) the only produce of the country. Three years ago it paid to raise hemp at two shillings the arroba (25 lbs.) and now the price is 13*s.* Railways are being made in all directions, and labourers are very scarce. However, I am getting things into shape, and hope to do some work; but my field is somewhat limited, as there are several other archæological expeditions on foot, one of them from the United States. I think I ought to put on record a little discovery I made some months ago. This is regarding the sign which occurs frequently in the Palenque Tablets and other



Central American inscriptions, as well as in some of the Maya and Aztec MSS. I believe it to be the numeral 20; though I cannot give you my reasons just now, as it would necessitate sending copies of many inscriptions, which I will do later on, but the statement may be of use to any one who may be working at the subject."

Ehlers' Ascent of Kilima-njaro.—Further details respecting this ascent, which we briefly noticed in last month's 'Proceedings,' are published in the current number of Peterman's 'Mitteilungen' in the form of a preliminary report (with map) on his journey, by the traveller himself. On 12th November, Herr Otto F. Ehlers, in company with Dr. Abbott, an American naturalist who had been collecting for upwards of a year in the country round Taveta, left Marangu with a party of 30 men. The first camp was pitched at the foot of a small crater almost due south of the eastern peak, Kimawenzi, at an altitude of about 9800 feet. On the following day Herr Ehlers made an excursion to Kimawenzi and reached a height of about 16,400 feet; any further ascent of this remarkably jagged mountain seemed to him impossible. The same day the travellers saw three specimens of a new species of antelope. The two following days were spent in collecting plants and searching for a suitable camping-place where the majority of the native followers might remain, while the travellers proceeded up the mountain. A spot was chosen to the west of their last camping ground, at an altitude of about 10,500 feet; from here the two travellers started with five men and provisions for four days, taking a northerly direction up the saddle, between Kibo and Kimawenzi. After some hours' marching they discovered that they had made the same mistake as Dr. Meyer had done in 1887, and were proceeding in a direct line to the summit of the lower eastern peak. Being at this moment overtaken by a snowstorm, they pitched their camp at an altitude of about 15,500. On the following morning, which broke bright and clear, they set out in a westerly direction over the newly-fallen snow, proceeding along the northern edge of the line of lava-hills mentioned by Dr. Meyer, whose route lay along their southern side. After much toilsome marching, snow having commenced to fall again, the natives were compelled to return, leaving the two travellers to push on to their last camping-ground (17th November). The morning of the 18th was exceptionally clear, and an early start was made over the hard-frozen snow. At seven o'clock they found themselves at an altitude of 16,200 feet, about the middle of the eastern side of the summit. Instead of attempting to ascend from this side as Dr. Meyer had done, they proceeded in a north-westerly direction over lava-streams and rocky boulders to the northern side of Kibo. Unfortunately, at this point Dr. Abbott completely broke down, and Herr Ehlers pushed on alone. Keeping to the east of a mighty lava-stream, he pushed his way over sand, ashes, and rubble, covered with the freshly-fallen snow, and, after repeated halts, but without suffering at all from the rarity of the atmo-

sphere, he arrived at 10 o'clock at the ice-wall, which completely encircles the actual summit, and the scaling of which at this point was impossible. He consequently proceeded along this wall of ice for some distance in the hope of finding a point at which it could be surmounted, but after a time was compelled to retrace his steps, owing to a steep fall in the ground. Descending the summit a little, he contrived by much toilsome climbing to get round to the north-east side of the summit, and here from a point of some little elevation he obtained a comparatively wide view over the summit. He could discover nothing in the form of a crater; the mass of snow and ice lay before him in a succession of gentle undulations. This is somewhat remarkable in view of Dr. Meyer's account of the crater-summit. He is unable to state at present the exact height reached, as his observations do not exactly agree with those of Dr. Meyer, and he prefers to wait until the instruments used have been tested. "In any case," he says, "the height exceeds 19,584 feet (6000 metres)." The descent was made by a somewhat different route, in a direct course to the south-east. At an altitude of 16,400 feet the track of an elephant was observed in the snow, also those of buffaloes and antelopes. Here also he found the last traces of vegetation in the form of a kind of everlasting flower. It may be remarked that, while at the highest part of the summit the traveller felt completely well, on the return march he suffered severely from headache, swollen eyelids, cracked lips, etc. The return to Marangu occupied three days.

The Geological structure of Madagascar.—The Rev. B. Baron, who devoted much attention to geology and botany during a long residence in Madagascar, read a paper on the geology of this island, at the meeting of the Geological Society, of March 6th last. From the brief report of his paper in the Society's Journal, we cull the following observations, as being of geographical interest. The central highlands of Madagascar consist of gneiss and other crystalline rocks, the general strike of which is parallel with the main axis of the island, and also, roughly, with that of the crystalline rocks of the mainland. The gneiss is often decayed to great depths, forming a red soil, and the loosened rock is deeply eaten into by streams. The harder masses of gneiss, having resisted decay, stand out in blocks, and have been mistaken for travelled boulders of glacial origin. The volcanic rocks are of much interest. The highest mountains, those lying to the south-west of the capital, consist, in their higher parts, of a mass of lava, for the most part basaltic, but with some sanidine-trachyte. The lava-streams are sometimes 25 miles long, and successive flows, up to 500 feet in thickness, are exposed by the valleys. From the great denudation which this area has undergone, and from the fact that no cones now remain, we may assume that this volcanic series is of some antiquity. Of the newer volcanic series there are numerous very perfect cones, dotting the surface of the gneiss in many places. No active volcano now exists in the island, but the occasional emission of carbonic

acid gas, the occurrence of numerous hot springs and deposits of siliceous sinter, and the frequency of small earthquake-shocks, seem to show that the volcanic forces are not entirely extinct. The ashes generally lie most thickly on the side of the cone between north and west: this is accounted for by the prevalence of the south-east trade winds. The volcanic areas are ranged roughly in a linear direction, corresponding with the longer axis of the island. Sedimentary rocks occur mainly on the western and southern sides of the island. The relations of these to each other have not yet been determined; but from the fossils (referred to the European standard) it seems that the following formations are represented:—Eocene, Upper Cretaceous, Neocomian, Oxfordian, Lower Oolites, Lias. Recent deposits fringe the coasts and are largely developed on the southern part of the island. East of the central line of watershed there is a long depression containing a wide alluvial deposit, probably an old lake-bed; terraces fringe its sides in many places. The lagoons of the eastern coast are due to alluvial deposits.—The paper concluded with some remarks on the geological antiquity of the island. Its separation is believed to date from early Pliocene times, if not earlier. This is the conclusion arrived at by Wallace from its fauna; the Author's detailed researches into its flora, recently described before the Linnean Society, show that while about five-sixths of its *genera* of plants are also found elsewhere, chiefly in tropical countries, at least four-fifths of its *species* are peculiar to Madagascar.

Trade Routes in Persia.—Mr. E. F. Law, Commercial Attaché for the Asiatic Provinces of Turkey, in the course of a recent visit to Persia, made some useful observations upon British trade and foreign competition in North Persia, which have been published by the Foreign Office (No. 119). With regard to trade routes, he says that the five great arteries for trade in Persia are (1) from Tabriz and Resht through Kasvin, eastwards and south-east; (2) from the Caspian through Shahrud into Khorassan; (3) from Bagdad northwards to the provinces of Hamadan and Kermanshah, and on to Teheran; (4) from Bushire northwards to Isfahan; (5) from Bender Abbas northwards to Khorassan. The routes from Resht through Kasvin, and from the Caspian through Shahrud, are the main channels for Russian commerce, as those from the Persian Gulf and Bagdad are the main channels for British and Indian trade. With reference to schemes for facilitating communications, the most important for English interests would be the making of a railroad from Bagdad to Teheran; the making of a rail, or even an ordinary, road from Shuster to Burujird, so that British trade might derive some advantage from the opening of the Karun River and, finally, the removal of the artificial obstructions to the through traffic by the Afghan route, viz., that from Kala Abdullah Khan through Herat.

A Consular Journey in the Shan States.—Mr. W. J. Archer, Acting British Vice-Consul at Chieng-Mai (Zimmé), made, last summer, a

journey from the latter place to Chieng-Tung, a town of some importance situated in the highlands, about 200 miles to the north-east of Chieng-Mai and about 60 miles from the right bank of the Mekong. Some extracts from Mr. Archer's journal have been recently published by the Foreign Office as a Parliamentary paper (C—5621). The journey was accomplished in the months of May and June, its object being to establish friendly relations with the chiefs of the district. Leaving Chieng-Mai on the 2nd of May, Mr. Archer followed the usual route along the valley of the Me Lao in a north-easterly direction to Chieng-hai, and finally to Chieng-sen, on the Mekong; the latter place, it will be remembered, would form the terminus of the line of railway from Bangkok to Yunnan, proposed by Mr. Holt S. Hallett.* On the 13th of May Mr. Archer left Chieng-sen and struck, in a northerly direction, into a comparatively unknown and very unsafe region. The road was almost impassable in many places, owing to fallen trees and dense jungle, through which, at times, a passage had to be cut; it lay over a succession of ridges and valleys, all the principal streams flowing east and south-east down to the Mekong. The highest range crossed, which rises from the valley of the Me Het, is 4400 feet above the level of the sea, and is scantily clothed with vegetation. The valleys are uninhabited, but a few villages of the Kha Khins, a hill tribe, are seen perched on the mountain summits. Very few traders were met with, and the route between Chieng Tung and the south appears to be almost deserted in the rainy season. Chieng Tung itself, where Mr. Archer arrived on 20th May, is situated on a plateau 2700 feet above the sea-level, surrounded by mountains except on the north. The soil in its neighbourhood is very poor and little cultivated; in this respect it stands in striking contrast with the rich populous plains round Chieng-Mai. The chief products are rice, cotton, opium, and tea; the imports are chiefly cotton goods from Moulmein, and salt, silk, etc., from Yunnan. The town has not a prosperous appearance, and whatever prosperity it enjoys is due to its unrivalled position as a market and a thoroughfare. The Consul's reception by the chiefs was at first anything but flattering, but at a subsequent interview some friendly intercourse took place. Mr. Archer's return journey to Chieng-sen was effected in seven days by the Payak route to the south-east; this, though longer, is less mountainous and preferable for elephants. The whole of the region north of Chieng-sen is infested by dacoits and is very unsafe; poverty being the only safeguard of the villages thinly scattered over the country. The result of Mr. Archer's journey is to add considerably to our knowledge of the Chieng-Tung district, as recent travellers in Siam do not appear to have visited this region. The information which the Consul gives as to the condition and prospects of trade along this route is also useful in connection with the development of commercial relations with Yunnan.

Deep Troughs of the Oceanic Depression.—Under this title, Prof. J. D. Dana contributes a paper to the last number of the 'American Journal of Science,' and discusses the causes which conduced to the formation of these troughs. The conclusions which he comes to are these. The facts, he maintains, lead far away from the idea that volcanic action has been predominant in determining the position of the deep-sea troughs. It has probably occasioned some deep depressions within a score or two of miles of the centre of action; but beyond this the great depths have probably had some other origin. It is further evident that deep-sea troughs are not a result of superficial causes of trough-making. Erosion over the ocean bottom cannot excavate troughs. The coldest water of the ocean stands in the deep holes or troughs, instead of running. After discussing and abandoning various superficially active causes assigned for these troughs in the ocean depths, Prof. Dana is led to look deeper, to the sources of the earth's energies, or its interior agencies of development. Whatever, he maintains, there is of system in the great feature-lines, whether marked in troughs, or mountain-chains, or island ranges, must come primarily from systematic work within. The work may have been manifested in long lines of flexures or fractures as steps in the process, but the conditions which gave directions to the lines left them subject to local causes of variation, and between the two agencies the resulting physiognomy is evolved. Prof. Dana adduces an example from the Pacific area of a volcanic nature, bearing on the comprehensiveness of the system of feature-lines in the ocean. If, he says, the ranges of volcanic lines were, in their origin, lines of fissure as a result of comprehensive increments, the lines should continue to be the courses of planes of weakness in the earth's crust. The New Zealand line, including the Kermadec Islands and the Tonga group, has been pointed to as one of these lines, and one of great prominence, since it is the chief north-eastward range of the broad Pacific, and nearly axial to the ocean. The series of volcanoes along the axis of New Zealand is in the same line. It was, Prof. Dana points out, noticed at the Tarawera eruption of 1883, that four or five days after the outbreak, and three after it had subsided, White Island, in the Bay of Plenty, at the north end of the New Zealand series, became unusually active; and two months later there was a violent eruption in the Tonga group, on the island of Niuafoou. May it not be, Prof. Dana suggests, that these disturbances were due to a slight shifting or movement along a series of old planes of fractures taking place successively from south to north; and hence that even now changes of level may take place through the same comprehensive cause that determined the existence of the earth's feature-lines?

CORRESPONDENCE.

Nilometers.

THE following letter has been communicated to us by our Associate E. A. Floyer (Egyptian Telegraph Department, Cairo), with the remark that the writer has access to the best sources of information on the subject.

CAIRO, January 19th, 1889.

In connection with the interesting paper of Colonel T. C. Ardagh, R.C.B., R.E., on Nilometers, published in the 'Proceedings of the Royal Geographical Society' for January 1889, the following additional notes may be found useful:—

The ancient Egyptians, not having the rapid means of communication at our command, were obliged to erect Nilometers all along the Nile to guide irrigation in the provinces; and they were the more necessary that Egyptian territory was sometimes divided between more than one dynasty ruling over it at one time.

According to Mr. Langlès, there were more than 15 Nilometers between Elephantine Island and the mouth of the river, besides a portable Nilometer which existed still at the time of the Emperor Theodosius.

The *raison d'être* of the Nilometer at the southern end of the Island of Rodah is the same as that of other Nilometers; the site is well chosen, as the width of the river is not exposed to variations, but the volume of water passing there does not represent the total discharge of the Nile. It is a well-known fact that part of the volume of water was diverted into canals, such as Bahr-Yousouf, in ancient times, and a larger volume finds nowadays its way into recently made canals, such as the Ibrahimieh, before the current reaches the Island of Rodah.

The Nilometer best suited for gauging the Nile discharge would be that situated at the entrance into Egyptian territory, in the island of Elephantine, near Assouan.

The first fraudulent alteration in the reading of the height of the Nile at the "Mekias" of Rodah was made by Amrou, under the Caliph Omar; the twelve inferior cubits were divided into 28 kirats each, the twelve superior cubits remaining divided into 24 kirats, as in the past; the reading adopted now by the Check is quite different; from the bottom of the Nilometer chamber up to the 17th cubit, each cubit is divided into 24 kirats, the length of each cubit being in the average 54 centimetres; from the 17th to the 23rd the cubit is still divided into 24 kirats, but the length of the cubit is reduced to 27 centimetres; and from the 23rd cubit upwards the length of the cubit assumes again the length of 54 centimetres.

There are other reasons which render impossible the accurate comparison of the readings at the Mekias made in the last ten centuries. It seems that the column has been several times changed or its scale altered. In 1739 Pococke reports that he found the scale confused and the division unequal; before this time, the Nilometer of Rodah was constructed by Sulciman, son of Abdulaziz; another one was built by Mamoun, and the present Nilometer is attributed to Motowakel, 10th Khalife of the Abbasside dynasty; it has since been repaired by Mostanser-billah, the 6th Fatimite prince, 1032, and after him by the French; it was formerly surmounted by a dome, which was demolished by the explosion of a powder magazine situated close by at Old Cairo.

All these changes explain the presence of capitals and stones which were subsequently found in the mud at the bottom of the well.

To the same height in cubits and kirats given in the table accompanying Colonel Ardagh's paper correspond different altitudes above the sea. This is likely to be attributed to the fact that some adopt the altitudes resulting from G. Richards's

survey of 1880, and others adopt the figures given in the survey made under the control of Mahmoud Pacha-el-Falaky in 1870.

Without entering into a long discussion about the survey to be preferred, it must be remarked that Mahmoud Pacha's survey extends from the Red Sea at Suez to the Mediterranean Sea at Alexandria; in Lower Egypt the survey followed several lines: the first started from the Nilometer, passing through Old Cairo and Kasr-el-Nil bridge to the western bank of the Nile, then extending to the Barrage and the Khatatbeh Canal, then to the foot of the Lybian mountain at Riachat, and continuing to the Mariout district, and terminating at the old sluices of the Mahmoudyeh Canal at Alexandria.

Then the surveyors proceeded from Alexandria along or near the bank of the canal to Atfeh, came back to Zawiet-Ghazal, and continued through Damanhour, Eeh-el-Baroud and the railway to the Barrage (on the west bank), and from the east bank to Choubrah, Kasr-el-Nil, Old Cairo, and terminating this circuit to the Nilometer wherefrom they had started; four surveys were then made across this circuit, in order to check the results obtained; and for the sake of verification, another survey was made from the Barrage to Chibin-el-Kom, Tantah, Kafr Zayat, Eeh-el-Baroud, up to Sitt-Radih at the foot of the Lybian mountain. A last survey was also made from the Barrage to Karinein Benha, and from there proceeding in the vicinity of the railway to Tantah.

All these surveys were made either with several levelling instruments employed at one time, or the surveys were repeated up to four times. After checking the altitudes obtained, Mahmoud Pacha declares them to be true, with an approximation of two or three centimetres above or below the mark.

As to G. Richards's survey, he started from a mark at the wall of the swing bridge at Alexandria, the altitude of which is given to him, and which he accepts without check, then proceeds to Atfeh, keeping close to the Mahmoudyeh Canal, comes back to Zauriet Ghazal, and follows the Khatatbeh Canal up to the Barrage, where his survey ends.

A survey of this kind can hardly be relied upon, there having been no attempt made to check the result. He gives for the zero of the scale of the Barrage the altitude of 10·615 mm., whereas Mahmoud Pacha gives the figure 10·011 mm., the difference being 0·604 m.; and as the mark from which he started at Alexandria has been given an altitude 0·303 m. too high, it must be inferred that the total cumulative errors made in the survey is equal to the difference between 0·604 m. and 0·303 m., viz. 0·301 m.

T. LATIF MANOUG, M.I.C.E.

Obituary.

Major-General John Baillie, F.R.G.S., H.M. Bengal Staff Corps.*—By the death of Major-General John Baillie, which occurred on the 14th January, our Society has suffered the loss of a Fellow of upwards of thirty years' standing, who, from the date of his election, had always displayed a warm interest in our work. General Baillie commenced, at the early age of sixteen, his career in the service of the Honourable East India Company, in which many of his relatives, cadets of a family long settled in Inverness, had preceded him, and into which two of his brothers also entered. His patronymic was already well known in India. Lieut.-Colonel William Baillie was the unfortunate commander of a British force at the battle of Polilore, in the neighbourhood of Seringapatam, which was routed and

* By Alexander F. Baillie.

completely destroyed in 1780 by the overwhelming host of Hyder Ali, and he is supposed to have died two years later, from poison administered by order of his conqueror; while his nephew, Lieut.-Colonel John Baillie, grandfather of our late colleague and many years resident in Oudh, gave his name to a guard at Lucknow, which, as "The Baillie Gate," has won a place in history and in poetry.

The subject of our notice joined the 26th Bengal Light Infantry in 1843, and was speedily engaged on active service, for, with his regiment, he went through the campaign on the Sutlej of 1845-46, and was present at the battles of Moodkee (Mudki), Ferozeshahr (Ferozshah), and Sohraon. He took his first furlough in 1854, and shortly after his return home volunteered for employment in the Crimea. Appointed Brigade-Major of a Division of the Turkish contingent, he at once joined the scene of operations, and during his service had the good fortune, from a military point of view, to be present at the attack on the Redan on the 18th June, 1855.

For his good service he was strongly recommended to the favourable notice of the Government of India in a military letter from the Court of Directors, and on his return to India in 1857, during the stirring episode of the Mutiny, he was appointed Field-Engineer to the Central Indian Force, commanded by the late Sir Hugh Rose (afterwards Lord Strathnairn), and took part with it in the siege and capture of Chandaree (Chánderi) and of Jhansi.

Such is a brief record of General Baillie's service in the field. The remainder of his military career was passed in the fulfilment of the many and varied duties which officers of the Staff Corps are called upon to perform, until his retirement in 1875.

In civil life he diligently applied himself to a more careful study of those subjects for which he had always displayed an inclination, but to which during active service he had been unable to give the attention that they deserved. Geography, astronomy, and photography formed the chief objects of study in the sedentary life to which, in his later years, he was forced to confine himself, as owing to his portly figure, energetic habits were rendered difficult; but he was a great reader and possessed a large fund of general knowledge. He was also an accurate and clever draughtsman, especially in the delineation of country, and in sketches in black and white. Geography, and in particular that important, if more limited branch of the science which is called Topography, had great attractions for him; and he was an unwearying collector of plans and descriptions of battle-fields, many of which he presented to military institutions; and lately he had applied himself to a careful study of the configuration of London in its earlier periods. The Society is indebted to General Baillie for several contributions of interest, and he invariably showed himself an earnest friend and ardent supporter of its objects.

He was also a member of the Royal Asiatic and Astronomical Societies, and of the Royal United Service Institution, and took a warm interest in their proceedings.

In social life General Baillie was esteemed on account of the extreme amiability of his nature, and his unassuming but universal charity—a charity that was shown not only with a generous hand, but by the avoidance of any harsh word that could have caused to a fellow-being the slightest grievance or annoyance. As a subaltern his purse was never closed to a brother-subaltern; as a field-officer he was always ready to aid and assist his juniors; and as a civilian his loss will be regretted by many whose sufferings he alleviated, or whose early steps in life he advanced.

An ancestor of General Baillie, after the unhappy days of the '45, won for himself the *soubriquet* of "Honest John," and that epithet has been frequently applied to, and was not undeserved by, the subject of this memoir. He died unmarried in his sixty-third year.

REPORT OF THE EVENING MEETINGS, SESSION 1888-9.

Seventh Meeting, 25th February, 1889.

General R. STRACHEY, R.E., F.R.S., President, in the Chair.

ELECTIONS.—*William Swain Beard, Esq.; John Bush, Esq.; Commander William Galton Carrow, R.N.; S. A. Hulton, Esq.; Luscombe Seaveille, Esq.; David Mark Williams, Esq., M.D.*

The paper read was:—

"Two Ascents of the Welle-Mobangi River from the Congo." By Captain Vangèle. Will be published in a subsequent number of the 'Proceedings.'

Eighth Meeting, 11th March, 1889.

General R. STRACHEY, R.E., F.R.S., President, in the Chair.

ELECTIONS.—*Rev. R. Pickering Ashe; Major T. Barland; Peter Goiffon, Esq.; Augustus Huxtable, Esq.; T. Carodock Kerry, Esq.; Sydney C. King-Farlow, Esq., B.A.; Iani Mukund Lalji (Private Secretary to the Maharajah of Oodeypore); Philip Moore, Esq.*

The paper read was:—

"The Trans-Caspian Railway." By the Hon. G. Curzon, M.P. Will appear, with map, in the May number of the 'Proceedings.'

Ninth Meeting, 25th March, 1889.

General Sir C. P. BEAUCHAMP WALKER, K.C.B., Vice-President, in the Chair.

ELECTIONS.—*Hon. C. W. Cochrane Baillie, M.P.; Charles A. V. Butler, Esq.; Charles Catling, Esq.; Major Harry Cooper (47th Regt.); Henry W. A. Cooper, Esq.; Major Henry Leslie Ellis (late Inniskilling Dragoons); Lieut.-General Sir Gerald Graham, K.C.B., G.C.M.G.; Arthur Hodgson, Esq.; Philip Knee, Esq. (H.M. Vice-Consul at Delagoa Bay); William Stronach Lockhart, Esq.; Jno. Davies Mason, Esq.; Robert Anderton Naylor, Esq.; Myer Salaman, Esq.; Gordon Rheam Sanderson, Esq.; Claude Sawyer, Esq.; Colonel E. T. Thackeray, V.C., C.B., R.E.*

Three papers, relating to the further Exploration of the Caucasus, were read:—

1. "The Ascent of Koshtantau." By A. F. Mummery, Esq.
2. "The Peaks of the Bezingi Glacier and Ushba." By H. W. Holder, Esq.
3. "Notes on Mr. W. F. Donkin's last journey and photographs." By C. T. Dent, Esq., President of the Alpine Club.

Will be published, with maps and drawings, in a subsequent number of the 'Proceedings.'

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—1st February, 1889: M. MILNE-EDWARDS, of the Institute, in the chair.—A communication was read from M. Antoine d'Abbadie, with reference to the course of the river Omo, as shown on the map prepared by M. Borelli, now travelling in the south of Abyssinia, which was presented at the last meeting. M. d'Abbadie quoted the opinion expressed to him some years ago by Professor Ph. Gilbert, to the effect that the Omo neither continued its course westwards to join the White Nile, as M. d'Abbadie had supposed, nor flowed eastward to form the upper course of the Juba, but that it flowed south into Victoria Nyanza. This would appear to agree with the information obtained by M. Borelli on the northern frontier of Kullo. The fact that Stanley, who circumnavigated the lake, said nothing about a great river on the eastern side, might, according to M. d'Abbadie, be accounted for, supposing that the river discharged itself into the lake by a delta, the channels of which, being lined with dense vegetation, might have been unnoticed by the traveller. M. d'Abbadie referred also to a fact communicated to him by M. Caliaque, viz. that the "Jila" or Orom-pilgrims were accustomed to periodically visit the original country of their great nation. In so doing they had to traverse a region inhabited by negroes, and the goal of their pilgrimage was situated on the right bank of the river Omo. This situation of the early home of the Oromo agreed with the information M. d'Abbadie himself obtained in Gudru.—Père Roblet forwarded a memoir, which had been requested of him, upon his geographical works in Madagascar, the results of which were embodied in his recently published map.—The Chairman intimated the presence at the meeting of M. Léon Jacob, civil engineer, who had just returned from a detailed exploration of the region between Brazzaville and Loango, with the view of establishing land communication. M. Jacob had, said the Chairman, surveyed nearly 2000 miles of routes, and had thus added greatly to our knowledge of the topography of this region. He had also carefully surveyed the region of the rapids of the Koulu for the purpose of utilising that river as a navigable route.—In conclusion, M. Jules Leclercq, late President of the Geographical Society of Belgium, recounted the main features of a journey which he had made in Turkistan last summer. In the course of his paper, which described at considerable length the condition and progress of the great Trans-Caspian Railway, M. Leclercq paid a glowing tribute to the zeal and ability of General Annenkoff, whom he styled the Russian Lesseps.

February 15th, 1889: M. MILNE-EDWARDS, of the Institute, in the chair.—The Chairman referred to the death of Dr. J. Broch, of Norway, who had been a member of the Society since 1867, and had contributed largely to the study of mathematical geography.—M. W. Huber, the General Secretary of the Commission on the Prizes, then announced the names of those to whom the Society had made the awards for the year 1889 as follows:—gold medal to Lieutenant Caron, for his survey work on the Niger and his voyage up the said river as far as Timbuktú; silver medal to M. H. Maigne, for his book entitled 'Nouvelle Géographie de la France'; La Roquette Prize to M. Charles Rabot, in consideration of his various missions in the high northern regions of Europe; the Erhard Prize to M. Fernand Foureau, for his map of the Sahara; and the Jomard Prize to M. Pierre Margry, late keeper of the records of the Department of the Navy, for his 'Mémoires et Documents pour servir à l'histoire des origines françaises des pays d'outre-mer.'—Two notes were read from the Prince of Monaco, with reference to certain scientific apparatus employed by him on his last voyage in *L'Hirondelle*.—M. Boulanger, a civil engineer, communicated to the Society some of the results of the official mission

with which he had been charged in Eastern Siberia. One of these results, which was of importance in connection with the future Trans-Siberian railway, was the discovery of the existence in the district of Irkutsk of a coal-basin of considerable extent.—A letter was read from M. Borelli, dated 8th January, from Cairo, upon the question of the course of the river Omo, which had lately been before the Society in connection with the writer's explorations in that region. He states that the river rises in the country of Limu-Knarea, flows about seventy miles to the north, then takes a S.S.E. and finally a S.S.W. direction; previously no one had followed it further south than $8^{\circ} 30'$, but he had traced it as far south as $6^{\circ} 20'$. Then during a long sojourn in the country of Djimma he had collected reliable information from natives coming from the south, from which it appeared, as stated by him in a former communication, that the Omo does not turn to the east-south-east to form the Juba, but flows to the south-west, then south, and at about 2° N. latitude forms the great Lake Shambara.—The Comte de Bizemont then announced that the International Geographical Congress for 1889 would be divided into seven sections:—(1) mathematical geography—president, M. Faye, of the Institute; (2) physical geography—president M. Daubrée, of the Institute; (3) economical and commercial geography—president, M. Levasseur, of the Institute; (4) historical geography—president, M. Barbié du Bocage, member of the Central Commission; (5) didactic geography—president, M. Vidal Lablache; (6) travels and exploration—president, M. Antoine d'Abbadie, of the Institute; (7) ethnographical and anthropological geography—president, Marquis de Nadaillac.—In conclusion, M. Martel gave an account of the results of his explorations in the caverns and grottoes of the departments of Lozère and Gard, which he undertook last summer for the purpose of studying the internal hydrology of the great French Causses.

— March 1st, 1889.—M. MILNE-EDWARDS in the chair.—The meeting was chiefly occupied with the reading of a paper by M. Edouard Blanc upon the oases of Southern Tunis, in which he gave a résumé of his travels and investigations in that region during the last four years. In the year 1885 he was charged with the mission of "fixing" the sand dunes which were threatening to encroach upon the large oases of South Tunis. Notwithstanding the exceptional difficulties of the task, owing to the great mass of these sand-hills, their shifting character, and the violence of the winds, the works executed by him were completely successful. In carrying out his mission he traversed the whole of Tunis and the neighbouring regions, and devoted himself to the study of various questions of geographical importance. M. Blanc described the principal features of the three leading groups of oases, viz., the Aarad, Djérid, and the Nefzaoua, and the situation and character of certain smaller oases. With reference to the question of the progressive desiccation of the Sahara and of the encroachment of the sand upon the oases, the author was of opinion that the destruction or non-maintenance of the irrigation works of the Romans was not a sufficient cause in accounting for the transformation which the country had undergone since the Roman period. This change could not be explained by reference to alternating periods of exceptional dryness or humidity, nor by disafforestation. All these causes were insufficient to account for the phenomenon. It must be attributed, in his opinion, to general geographical causes resulting from modifications in the form of continents, such as the immersion of the steppes of Central Asia and the progressive disappearance of the snow which existed during the glacial epoch on certain mountain masses of Europe, and perhaps of Africa. The Atlantean subsidence, and possibly also the upheaval of a part of the depressions of western Sahara, might have acted in the same direction. These different causes have produced an insufficiency of moisture in the air-currents which prevail in this part of Africa and the equilibrium between the amount of rainfall and evaporation being

once disturbed, a progressive desiccation has resulted. M. Blanc then described the country of the Urghemma and also that of the Troglodytes, the northern part of which was visited in 1887 by MM. Hamy and de la Croix. The desert of the eastern Erg, which lies to the south of Nefzaoua and Djerid, was crossed by the traveller from east to west by a new route. With regard to the important question of the future of the oasis region of Tunis, M. Blanc is not over confident. Although it is true that there are great sheets of subterranean water, and that wherever artesian wells are dug, artificial oases of considerable fertility can be formed, it is also certain that the store of water underground is not inexhaustible, and that the multiplication of these wells diminishes the supply of each. This is notably the case even in the famous oasis of Ued-Rirh in Algeria, which is an exceptionally favoured region. M. Blanc calculates that to keep at the surface of a given tract of country the amount of moisture necessary for cultivation, ten times more water would be needed in Tunis than in France, taking evaporation into account: as a fact the rainfall is ten times less than in France, so that the annual rainfall is only one-hundredth part of the amount required for irrigation during the year, and the amount of water which is available eventually is of course still less. It is therefore quite impossible to irrigate the surface of the entire country by means of artesian wells. M. Blanc is of opinion that the only way to irrigate this vast region would be to distil the seawater of the Mediterranean, and store the fresh water so obtained in vast reservoirs at elevated points along the coast, whence it could be conveyed by culverts into the interior.

Geographical Society of Berlin—March 2nd, 1889: Baron VON RICHTHOFEN in the chair.—The Chairman announced that the Eighth German Geographical Congress would be held at Berlin from the 24th to 26th of April. The programme had reference chiefly to the questions of variations of climate during short and long periods, measurements of altitudes, the orthography of geographical names, and the theory of denudation-level and its practical application. The following questions concerning geography in schools would be discussed—the relation of the school atlas to the geographical school-books, the practical realisation of excursions for the purpose of geographical instruction, and the employment of collections of natural products in geographical teaching. An exhibition of instruments for measuring altitudes, of graphical and plastic representations of relative heights, especially those which aimed at a correct representation of the latter as they appeared in nature, and of the literature with reference thereto, was arranged.—The Society then elected General R. Strachey, President of the Royal Geographical Society of London, and Dr. Radde, of Tiflis, as honorary fellows of the Society.—The Society learned with regret the death of His Excellency Chief Privy Councillor von Decken, the well-known geologist.—The great map of Flegel's journeys in the Benué region (1882-3) was stated to have been completed by Dr. Kiepert, after many years' work, and was exhibited in proof in three large sheets.—Dr. Von Lendenfeld gave an account, illustrated with lime-light projections, of his travels in the Australian and New Zealand Alps, the highest peaks of which, including Mount Townsend, 7328 feet in height, he ascended. The forest limit in the Australian Alps lies at an altitude of 4600 feet; the snow line, where the snow fields are perpetual, at 6550 feet. The existence of an earlier extensive glacier-covering is proved by marks of glacial action which remain very distinct. The alpine meadows resemble in every way those of the German Alps. In New Zealand the glaciers on the western slopes descend to as low as 650 feet, on the dry eastern side to 2300 feet. The great antiquity of the New Zealand Alps is shown in the broad transversal valleys, which are much broader than the longitudinal valleys of the European Alps. The moraine formation is very marked, and even secondary glaciers have sometimes as many as six middle moraines. The

fjords of New Zealand are the finest in the world, and, like those of Norway, possess a greater depth of water than the sea in front of them, which is a sure proof of their origin through the action of ice.—Professor Foerster, Director of the Imperial Observatory, spoke, with the assistance of the report of the English Commission, upon the definitive results of the investigations connected with the Krakatoa phenomena. The speaker emphasised the fact that, in the face of the results of the exploration, the doubt originally entertained in many quarters as to the connection of the twilight phenomena of the years 1883 and 1884 with the volcanic eruption in question would disappear everywhere. Although it must be allowed that striking twilight phenomena are by no means infrequent in the tropics, it must still be remembered that it is just in the tropics that a large amount of dust, smoke, and fumes are continually imported in the atmosphere in consequence of the gigantic savannab-fires, and that it is these phenomena which form a confirmation of those views. That earthquake waves on the mainland often spread to a very great distance is demonstrated by the fact that the great earthquake at Tashkend (Vernoe) of the 13th June, 1887, produced an effect on the sensitive levels of the astronomical instruments at Königsberg and Breslau. Professor Foerster also remarked upon the distribution of sound effects, waves of air-pressure, luminous clouds, and other matters dealt with in the Report of the Royal Society's Commission.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Bonaparte, [Prince] Roland.—Note on the Lapps of Finmark, Paris, 1886: small 4to., pp. 11. [Presented by the Author.]

Johnstone, John K.—The Isle of Axholme; its Place-names and River-names. Epworth, Foster Barnes, 1886: 8vo., pp. [xii.] and 64. [Presented by the Author.]

Mr. Johnstone, who is a teacher in Axholme (Lincolnshire), has made a very complete study of the place-names of this interesting district, in which so much of the history of the county has been transacted. The results, as presented in this little volume, indicate not only minute knowledge, but much thoughtfulness and wide reading. The book is a good sample of what can be done to add to our knowledge of a district by those who are permanently resident in it.

[Murray's Handbooks.]—A Handbook for Travellers in Holland and Belgium. Twenty-first Edition. With Maps and Plans. London, John Murray, 1889: Post 8vo., pp. [22] and 268. Price 6s.

A new feature is the addition of an Index and Directory, after the manner of Joanne's Guides, containing much useful information as to conveyances, accommodation, and similar matters.

ASIA.

[British North Borneo.]—Colonial and Indian Exhibition, 1886. Handbook of British North Borneo. Compiled from Reports received from Governor Treacher and other officers in the British North Borneo Company's service. With an Introduction by Sir Rutherford Alcock, K.C.B., D.C.L. London, W. Clowes & Sons, 1886: 8vo., pp. 159, maps.

AFRICA.

Africa.—No. 8 (1888). Correspondence respecting the Expedition for the Relief of Emin Pasha: 1886-87. [C.-5601.] London, Harrison & Sons, 1888: folio, pp. iii. and 25. Price 4*d*.

— No. 9 (1888). Paper respecting the Reported Capture of Emin Pasha and Mr. Stanley. [C.-5602.] London, Harrison & Sons, 1888: folio. Price 4*d*.

— No. 10 (1888). Further Correspondence respecting Germany and Zanzibar. [C.-5603.] London, Harrison & Sons, 1888: folio, pp. vi. and 104. Price 1*s*. 2*d*.

Arnot, Fred. S.—Garenganze; or Seven Years' Pioneer Mission Work in Central Africa. London, James E. Hawkins [1889]: 8vo., pp. [xii.] and 276. Price 2*s*. 6*d*. [Presented by the Author.]

Mr. Arnot's modest and interesting narrative will be welcome to all who have read his paper in the 'Proceedings.' As that paper contains a full summary of the geographical results obtained by Mr. Arnot, it is unnecessary to go over the ground again. His narrative, however, will be found to fill up many details, and to contain much useful information on the whole of the region traversed by him, especially on the Zambesi, and the wonderful river country west of the Garenganze region. Mr. Arnot has just left England again to resume his work among the Garenganze, and when next we hear from him we may expect even more important results than those presented in this volume. In the appendix will be found an exceedingly clear and useful summary of the work in the Bangweolo region by Livingstone and Lieut. Giraud.

Bechuanaland.—Further Correspondence respecting the Affairs of Bechuanaland and Adjacent Territories. (In continuation of [C.-5363] April, 1888.) [C.-5524.] London, Eyre and Spottiswoode, 1888: folio, pp. vi. and 44, maps and plan. Price 2*s*.

Borsari, Ferdinando.—Geografia, Etnologica e Storica della Tripolitania, Cirenaica, e Fezzan, con Cenni sulla Storia di queste Regioni e sul Silfo della Cirenaica. Napoli, 1888: 8vo., pp. 278. [Presented by the Author.]

This seems to contain much carefully compiled and well-arranged information on a region of considerable interest at present. Prof. Borsari has consulted many sources for his information, and not the least valuable section of the work are the bibliographies which accompany each section. The chief defect of the book is the want of a map.

Dove, Dr. Karl.—Das Klima des Aussertropischen Südafrika mit Berücksichtigung der geographischen und wirtschaftlichen Beziehungen nach klimatischen Provinzen dargestellt. Göttingen, Vandenhoeck und Ruprecht, 1888: 8vo., pp. viii. and 160. Price 4*s*. 2*d*.

Dr. Dove has done great service, both to geography and to meteorology, by bringing together in this handy form the data available for a consideration of the climate of extra-tropical South Africa. His object is practical as well as scientific, as he affords us the means of judging of the suitability of the various parts of South Africa for European occupation. The region embraced in his conception of extra-tropical South Africa, may be said generally to coincide with the geographical conception of South Africa proper, and to include all the higher lands south of the Zambesi, the Kalahari trough and certain portions of Zwazi and Zulu lands being thus excluded. In the first section of the work Dr. Dove discusses the question of the climatal and geographical limits of South Africa, and the general meteorological conditions of the region. The second section deals with the climatological provinces of South Africa, which consist of (1) the region of winter rains; (2) the waterless region with prevailing spring and autumn rains; (3) the region of great summer rains; (4) the West Coast.

The last section is one of very great practical importance, dealing as it does with the industrial development of South Africa on the basis of climatological considerations. There are three charts showing (1) the yearly isotherms; (2) the climatological provinces; (3) the annual rainfall. It would be a great service to render this little book accessible to intending English settlers in South Africa by means of a translation.

Latimer, Isaac.—A Summer Climate in Winter. Notes of Travel in the Islands of Teneriffe and Grand Canary. With maps. Second edition. Plymouth, *Western Daily Mercury* Office; London, Simpkin, Marshall & Co., 1887: 12mo., pp. 149. Price 1s. [Presented by the Author.]

— **S. Francaes.**—The English in Canary Isles, being a journal in Tenerife and Gran Canaria, with latest information. With a map of the islands and eight illustrations. Plymouth, *Western Daily Mercury* Office; London, Simpkin, Marshall & Co. [1888]: 8vo., pp. ii. and 340. Price 4s. [Presented by the Author.]

These two little volumes describe a visit to Teneriffe and Grand Canary. The first, by Mr. Latimer, consists of a series of letters reprinted from the (Plymouth) *Western Daily Mercury*, giving an account of the islands, their scenery, climate, fauna and flora, customs of the people, &c., with some useful hints, in the form of an appendix, regarding steamers to Madeira, Teneriffe, and Grand Canary, hotel accommodation, &c.

Miss Latimer's account is fuller. She endeavours to describe the life of the English in the Canary Isles, and to relate how she passed the time in the islands, what there was to see, &c. The maps and illustrations are not equal to the text.

Mathers, Edward P.—Golden South Africa, or the Gold Fields Revisited; being Further Glimpses of the Gold Fields of South Africa. Fourth edition. London, W. B. Whittingham & Co., 1889: 8vo., pp. viii., ii., and 389, maps. Price 2s. 6d. [Presented by the Publishers.]

Wolff, Dr. Willy.—Von Banana zum Kiamwo. Eine Forschungsreise in Westafrika im Auftrage des afrikanischen Gesellschaft in Deutschland. Oldenburg und Leipzig, 1889, pp. 248, with a map. Price 4 marks.

In this unpretentious little volume Dr. Wolff gives a narrative of his travels in Africa in 1885, while attached as physician, zoologist, and anthropologist to the expedition organised by the German African Society to Western Central Africa. A brief notice of this expedition is contained in our 'Proceedings' (1886, p. 634). This, the first detailed account of it published, refers only to the author's journey and is dedicated by him to King Louis I. of Portugal. Dr. Wolff undertook to pioneer a route from San Salvador eastward to the river Kwango, while his companions, Lieutenants Kund and Tappenbeck, were to ascend this great tributary of the Congo and meet him on its upper waters. He successfully carried out his undertaking, reaching the Kwango in lat. approx. 5° 53' S. and long. approx. 17° 3' E., and then proceeded a few marches up its right bank to the residence of the great Kiamwo, the widely known and feared negro king.

After waiting fourteen days in the vain expectation of the arrival of his countrymen, whom various circumstances had delayed, Dr. Wolff returned to San Salvador by a more southern route, through the countries of Pombo, Pombo, and Zosso, and then retraced his steps to the lower Congo, where, finding that he could be of little further use to the Society which had sent him out, owing to his debilitated state of health, he decided on going home. His journey was accomplished with only six porters, natives of Loango, who, considering they had never been employed on an inland journey before, behaved remarkably well.

Besides the record of his journey, the various incidents that befel him, his interviews with the chiefs, sporting adventures, and observations on what he saw, Dr. Wolff gives in a concluding chapter his views on German colonial enterprise

in Central Africa. He is hopeful as regards its future. He believes that means will be found of resisting the deadly attacks of malarial fevers by bacillary inoculation, and that acclimatisation will follow. But for the present, and for some time to come, the trading colonist must be preferred to the agriculturist, for the white man cannot hope to compete with the negro in physical strength, and must depend on his intellectual superiority. Trade places him in the most favourable position for the exercise of his mental powers, besides conferring great benefits on the producers of his merchandise at home. Dr. Wolff warns his countrymen, however, not to be too sanguine; enthusiasm will surely end in disappointment.—[E. D. M.]

Zululand.—Further Correspondence respecting the Affairs of Zululand and Adjacent Territories. (In continuation of [C.—5331], of March 1888) [C.—5522]. London, Eyre and Spottiswoode, 1888: folio, pp. ix. and 126. Price 1s. 6d.

AMERICA.

[**America, United States.**].—Annual Report of the Chief Signal Officer of the Army to the Secretary of War for the year 1887. Part 2. Washington, Government Printing Office, 1887: 8vo., pp. 392, plates. [Presented by the Chief Signal Officer, U.S. Army.]

[—].—Annual Report of the Chief of Engineers, United States Army, to the Secretary of War, for the year 1888. In four parts. Washington, Government Printing Office, 1888: 8vo., maps and plates. [Presented by the Chief of Engineers, U.S. Army.]

[—].—Department of the Interior, United States Geological Survey, J. W. Powell, Director. Bulletins of the United States Geological Survey. Nos. 40–47. Washington, Government Printing Office, 1887–88: 8vo., maps and plates. [Presented by the Director of the Survey.]

No. 40. Changes in River Courses in Washington Territory due to Glaciation, by Bailey Willis. No. 44. Bibliography of North American Geology for 1886, by Nelson H. Darton. No. 45. The present condition of knowledge of the Geology of Texas, by Robert T. Hill.

Fream, [Prof.] W.—Agricultural Canada: a Record of Progress. Published under the direction of the Government of Canada (Department of Agriculture), 1889: 8vo., pp. 64, map.

GENERAL.

Macgregor, Lady (edited by).—The Life and Opinions of Major-General Sir Charles Metcalfe Macgregor, K.C.B., C.S.L., C.I.E., Quartermaster-General in India. [With maps and illustrations.] Edinburgh and London, William Blackwood and Sons, 1888: 2 vols. 8vo.; vol. i., pp. xviii. and 367; vol. ii., pp. x. and (with Appendix and Index) 438. Price 35s. [Presented by the Publishers.]

These two handsome volumes give a well-written and connected account of the life of a distinguished soldier, writer, and explorer, and cannot fail to command the attention of a very large class of readers, not only on account of the singularly interesting personality of the man, but also of the stirring times and events in which he moved and so largely figured; and Lady Macgregor deserves credit for the rapidity with which the work has been compiled and brought out so soon after her husband's death, as well as for the extreme care and accuracy with which it has been edited and revised.

Sir Charles Macgregor was in every way a born soldier. A scion of the famous clan of that name, and sprung from a long line of warlike ancestors, he was essentially a fighting man—one who loved fighting for its own sake; and his life was one long warfare. He fought throughout his whole career—not only with his sword, but with his pen and with his tongue—against difficulties,

dangers, and hardships that would have daunted many of the bravest; and, finally, when prostrated by his fatal sickness, he struggled manfully with that foe against which even his great courage and ability were unavailing.

Being sent on frontier duty, he mastered surveying and the use of instruments, a knowledge that he turned to excellent account in his various journeys and explorations. Perhaps the most striking display of his extreme energy and activity occurred during the terrible famine of 1874 in North Behar, when he greatly distinguished himself under Sir Richard Temple, the Lieutenant-Governor of Bengal, who had placed the entire organisation of the transport of grain under his direction. Some slight idea of the magnitude of this operation may be gained from the fact that it comprised the carriage of no less than 185,714 tons of rice from the Ganges to 142 different magazines, at an average distance of 70 miles from the base, in 120 days; the keeping in repair of 1173 miles of road, and the construction and maintenance of 59 bridges; and involved the direct working of 4419 carts, 11,280 ponies and mules, 11,948 bullocks, 98 buffaloes, and 1360 camels, besides the direction of 44,679 carts belonging to contractors, necessitating a staff of 35 Europeans and 47,000 natives.

Sir Charles Macgregor's military career was a singularly stirring and active one, embracing a period of over thirty years, during which he rose from ensign in the 57th Bengal Native Infantry, to be major-general, and quartermaster-general in India. He served throughout the Indian Mutiny, the China expedition of 1860, the Bhutan campaign, the Abyssinian expedition, and the last Afghan war, in which he commanded a division during the celebrated march from Kabul to Kandahar; his last active service being in 1885 as General Officer Commanding Panjab Frontier Force.

Brilliant and distinguished as his military career undoubtedly was, it is, however, as a geographer and an explorer that Sir Charles Macgregor's name will be best remembered by this Society, where his travels in Persia, Afghanistan, and Baluchistan, and his three publications, 'Narrative of a Journey through the Province of Khorassan,' 'Wanderings in Baluchistan,' and 'Central Asian Gazetteer,' will always insure him a front rank among our Fellows. The last-named work was one that entailed an enormous amount of labour on the compiler, and occupied him for thirty-two months, from November 1868 to April 1873. It is invaluable as a book of reference for the countries it treats of, no pains having been spared to make it as complete as possible by the author, who worked at it with his characteristic energy and thoroughness. His travels are ably described in the first two mentioned works, the interest of which is mainly due to the fact of his having traversed districts never before visited by a European, and also to the author's almost unrivalled powers of observing and noting down what he saw as he went along.

His journey through Persia was undertaken in 1875, on his way home to Europe on furlough, and he had originally intended riding to Herat, and thence, via Mashad, to Astrabad; but as travelling in Afghanistan was at that time considered unsafe for a British officer, he altered his plans, and determined to proceed via Bushire to Teheran, and thence across the Caspian and Russia to England. After landing at Bushire, and riding to Shiraz, his plans again became unsettled, for at the latter place he met with Colonel Ross, who told him of a route from Shiraz to Yezd, which had never been traversed by any Englishman, and this being a temptation irresistible to his adventurous spirit, he engaged a muleteer, left Shiraz on the 24th April, and spent the next day at the ruins of Persepolis, in which he could not see anything either particularly beautiful or wonderful (although he seems to have been struck with the size of the stones used in the buildings), and on 6th May arrived at Yezd. The country he traversed was stony and barren, with cultivation only round the villages, and within a few miles of Yezd. He then struck across the desert of Kavir for 70 miles, and reached Tabbas, which he describes as not a place of any importance, and from there proceeded to Bushruiyeh, never before visited by an Englishman, and which he found to be simply a village of some 600 houses, not a town of 30,000 inhabitants, as always supposed; and instead of being situated in the great salt desert, it was surrounded by well-cultivated land. On 8th June he arrived at

Birjand, and determined to go on to Herat through a totally unknown country. He therefore started on the 11th, and, passing by Baj and Yazdan, crossed the Afghan frontier on the 18th, and, entering the valley of the Harirud, went on to Pahrâh, 50 miles inside the border, where he despatched a messenger to the Mustaufi of Herat to announce his approach. Although receiving a warning not to proceed, he went on to Kargan, within five miles of Herat, where he was met by a party of Sowars, and conducted back across the frontier in the direction of Mashad. On arrival at the latter place he heard that the Persian garrison of Sarakhs was about to be relieved, and determined to accompany the relief, and see as much of the country as he could. This was an entirely new route for an Englishman, and took the party eight days to traverse. Sir Charles made a careful survey of the immense fort at Sarakhs, the plan of which was afterwards unfortunately stolen from him, so that he was left with only his rough notes of the work. He made a short excursion in the direction of Merv, and then returned to Mashad, proceeding afterwards along the Atrak, and on to Sharud, from whence he struck across the Shalwar Kuh Pass to Astrabad, took steamer at Bunderfez across the Caspian to Enzelleh, and thence journeyed via Erivan and Tiflis across the Caucasus, and home by way of Karkof, Cracow, and Vienna, reaching England on 15th November.

On returning to India in 1876, he determined to pass through Baluchistan, and explore some new country. He left London on 25th September, in company with Captain Lockwood, and proceeded via Constantinople to Trebizond, from whence they rode to Erzeroum and Kars, where they minutely examined and noted the fortifications. Then through the highlands of Armenia, and down the Tigris on a raft to Baghdad, and thence via Basrah and Bushire to Jask. From Jask the travellers proceeded to Gwadar, where they separated in order to traverse different roads to Panjgur: Sir Charles Macgregor selecting that to the east, on which he passed one of the peculiar mud-volcanos. At Panjgur Sir Charles was rejoined by Captain Lockwood, whence the track was entirely new, and the travellers suffered great privations in traversing the barren and waterless district. On the 4th March, 1877, the travellers again separated, Macgregor pushing on to Kelat, and Lockwood coming down the Bolan Pass, and reaching Jacobabad the day after his companion.

NEW MAPS.

(By J. COLES, *Map Curator R.G.A.*)

WORLD.

Magnetism of the Earth.—Erdkarten mit Linien gleicher magnetischer Variation, gleicher magnetischer Inklination, und gleicher magnetischer Horizontal-Intensität, nach Gauss'schen Einheiten. 1885, O. Von Dr. G. Neumayer, 3 Blatt. Hamburg, Friedrichsen & Co. Price 3s. (*Dulau.*)

On sheet No. I. the lines of equal magnetic variation are shown for every degree; the region of westerly variation is coloured brown, and that of easterly left white. Sheet II. exhibits the lines of equal magnetic inclination for every five degrees, and Sheet III. the lines of horizontal intensity.

EUROPE.

Bayern.—Topographischer Atlas der Königreich ——. Scale 1:50,000 or 1·4 inches to a geographical mile. Blatt 64, Landau, Ost und West—74, Illetissen, Ost. München. Price 2s. each sheet. (*Dulau.*)

France.—Carte de la ——, dressé par le Service Vicinal par ordre du Ministre de l'Intérieur. Scale 1:100,000 or 1·3 geographical miles to an inch. Sheets: V.—16, Gourin; V.—15, Quintin; VII.—16, St. Méen; VIII.—14, St. Malo;

IX.—15, Fougères; IX.—16, Vitré; XX.—22, Gueugnon; XXI.—22, St. Genoux; XXII.—26, Lyon (Sud-Est); XXII.—27, La Côte St. André; XXIII.—32, Sault; XXXIII.—33, Apt. Hachette et Cie., Paris. Price 7d. each sheet. (Dulau.)

ORDNANCE SURVEY MAPS.

Publications issued during the month of February 1869.

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey**: 10 N.E., 11 N.W., 15 S.W.; 1s. each. **Brecknockshire**: 46 S.E., 49 N.W.; 1s. each. **Cardiganshire**: 19 N.E., S.E., 20 S.E., 23 N.E., S.W., S.E., 24 N.W., S.W., 25 N.W., 30 N.W., N.E., 31 N.E., S.W., S.E., 33 N.W., S.W., S.E., 36 N.E., 39 S.W., 40 N.E., S.E., 45 N.W., N.E.; 1s. each. **Cardiganshire**: 5 S.W., 6 S.E., 13 N.W., N.E., S.E., 24 N.E., S.E., 28 S.E., 36 S.W., 47 S.W., 54 N.E., S.E.; 1s. each. **Carmarthenshire**: 1 S.E., 3 S.W., 7 S.W., 8 S.E., 17 S.W., 19 S.E., 19 S.W., 23 N.W., 36 N.E., 39 N.E., 43 N.E., 47 N.E., 48 N.W.; 1s. each. **Devonshire**: 21 N.E., 22 N.W., 23 N.W., S.W., 25 S.E., 33 N.W., N.E., S.W., S.E., 34 N.W., 36 S.E., 48 S.E., 57 S.E., 59 N.E., 60 S.W., 71 N.E., 81 S.W., S.E., 83 S.W., 93 S.E., 94 S.W., 103 S.W.; 1s. each. **Dorsetshire**: 40 S.E.; 1s. **Lincolnshire**: 48 S.W., 106 N.W.; 1s. each. **Merionethshire**: 12 N.E.; 1s. **Pembrokeshire**: 2 N.E., 36 S.W.; 1s. each. **Radnorshire**: 1 S.E., 4 N.W.; 1s. each. **Shropshire**: 31 S.E.; 1s. **Somersetshire**: 23 S.E., 32 S.W., S.E., 34 N.W., S.W., 44 N.E., 45 S.E.; 1s. each. **Staffordshire**: 24 N.E., 66 S.W., 72 S.E.; 1s. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Anglesey**: III. 9, 13, 3s. each; VI. 1, 4s.; VI. 2, 3s.; VI. 4, 4s.; VI. 5, 7, 8, 9, 11, 12, 13, 14, VII. 1, 2, 5, 6, 9, 15, 3s. each; XII. 1, 2, 4s. each; XII. 5, 8, XIII. 13, 14, 3s. each. **Brecknockshire**: VII. 12, 13, 15, X. 9, 10, 13, XIV. 3, XV. 4, 3s. each; XVII. 12, 5s.; XVII. 14, 4s.; XVII. 15, 3s.; XXII. 2, 6, 4s. each; XXX. 5, 3s. **Cambridgeshire**: VII. 7, 5s.; VII. 8, 4s.; XIV. 5, 3s.; XVI. 1, 6s. 6d.; XXVII. 9, 13, 4s. each. **Cardiganshire**: 1, 6, XII. 10, 11, 4s. each. **Carmarthenshire**: VII. 10, 11, 4s. each; VII. 15, N.W. 5, 14, XXIV. 2, 3, 4, 5, 9, XXXII. 3, 4, 5, 6, 7, 8, 10, 11, 14, XLVI. 10, 3s. each; XLVI. 13, 4s. **Devonshire**: VIII. 1, 2, 3, 5, 7, IX. 1, 2, 3, 8, 9, 10, XIX. 1, 3s. each; XIX. 2, 5s.; XLII. 2, 3, LIII. 1, LXXVIII. 2, LXXXI. 3, 9, 13, CL. 1, 6, 11, 3s. each; CL. 12, CLX. 8, 4s. each. **Dorsetshire**: XI. 2, XVI. 12, 16, 3s. each; XXI. 1, 4s.; XXI. 5, 13, 14, XXVI. 8, XXX. 14, XI. 6, 3s. each; XL. 10, 4s.; XL. 13, 14, XII. 2, 5, 10, 11, XLII. 15, 16, XLIII. 9, 3s. each; XLVI. 1, 4s.; XLVI. 4, 6, 7, XLVII. 1, 5, 3s. each; XLVIII. 4, XLIX. 5, 6, 4s. each. **Herefordshire**: X. 7, XVII. 10, 3s. each; XXX. 12, 5s. **Huntingdonshire**: V. 4, 4s.; V. 6, 7, 9, 10, 3s. each; V. 12, 16, 16, 4s. each; VI. 5, 3s.; VI. 14, IX. 4, 4s. each; IX. 6, 7, 11, 12, X. 13, 3s. each; X. 14, 4s.; XIII. 2, 3s.; XIII. 3, 4s.; XIII. 6, 13, XIV. 3, 3s. each; XIV. 4, 4s.; XIV. 14, 3s.; XV. 2, 4s.; XVI. 2, 4, 6, XXI. 14, 3s. each. **Leicestershire**: XII. 1, 3s. **Lincolnshire**: XXII. 2, 4s.; XL. 14, LXVI. 5, 8, 13, LXXV. 1, 2, 5, 8, 3s. each; LXXXIX. 3, 5, 4s. each; LXXXIX. 7, 3s.; CIV. 6, 4s.; CXIII. 8, CXIV. 4, 12, 15, 16, CXV. 1, 11, CXXIV. 2, 5, 3s. each; CXXV. 4, 4s.; CXXV. 5, 3s.; CXXV. 7, 8, 4s. each; CXXV. 13, 3s.; CXXV. 14, CXXVI. 12, 15, 4s. each; CXXVI. 16, 3s.; CXXVII. 9, 4s.; CXXVIII. 13, 3s.; CXXVIII. 4, 9, 4s. each. **Merionethshire**: XIII. 8, XIV. 2, XX. 7, XXI. 16, XXII. 9, 10, XXIII. 7, XXVIII. 8, 15, XXIX. 5, XXXIII. 4, XXXIV. 3, XXXV. 6, XXXVII. 10, XXXVIII. 3, 4, 7, 11, 13, 14, XLII. 12, 15, 16, XLIII. 1, 4, 5, 7, 9, 3s. each; XLIII. 12, 4s.; XLIII. 15, XLIII. 2, 6, XIV. 8, 3s. each; XLVI. 6, XLVIII. 6, 4s. each. **Montgomeryshire**: XVIII. 12, 4s.; XIX. 2, 6, 7, 13, 15, 16, 3s. each. **Norfolk**: LV. 7, 8s.; LV. 8, 4s. **Northamptonshire**: VIII. 8, 4s. **Radnorshire**: XVII. 11, 16, XXIV. 12, 15, XXV. 7, 13, XXIX. 8, XXXVI. 7, 9, 3s. each; XXXVI. 12, 5s.; XXXVI. 14, 4s.; XXXVI. 15, 3s.; XXXIX. 2, 4s. **Somersetshire**: XXX. 14, 6s. 6d.; XXX. 15, 4s.; XLIII. 2, 5s.; XLIII. 3, 4s.; XLVII. 9, 13, 3s. each; L. 1, 2, 3, 4s. each; L. 8, 5s.; L. 7, 4s.; L. 10, 5s.; LVIII. 1, 2, 5, 6, 10, 14, LX. 14, LX. 10, 3s. each; LXI. 14, 4s.; LXVIII. 1, 2, 3, 4, 6, 7, LXIX. 14, 3s. each; LXX. 3, 7, LXXVIII. 1, 4s. each; LXXVIII. 5, 3s.; XC. 1, 4s.; XC. 2, 3s.; XCI. 4, 5s. **Staffordshire**: LXV. 10, 4s. **Warwickshire**: V. 10, 4s.; VI. 14, VIII. 4, 3s. each; X. 7, 4s.; X. 8, 3s.; X. 13, 4s.; XL. 1, 3s.; XVI. 16, 5s.; XXVIII. 1, 16, 4s. each.

Town Plans—10-feet scale:—

ENGLAND AND WALES: Barnstable, XIII. 2, 8, 9, 10, 14, 15, 19, 24, 25; XIII. 8, 16, 21; XIII. 6, 4, 5, 9, 15; XIII. 7, 1, 2, 6, 7, 11, 12, 17; 2s. 6d. each. Birmingham, VI. 13, 8; VIII. 13, 13, 14, 15, 16, 18, 20, 22, 24, 25; VIII. 14, 6, 7, 11, 17; XIII. 8, 9, 20, 25; XIV. 9, 2, 3, 5, 9; LXIX. 13, 2, 7; 2s. 6d. each. Boston, CIX. 9, 13, 15, 19; CIX. 13, 9, 10; 2s. 6d. each. Coventry, XXI. 8, 22; 2s. 6d. each. Darnley, CII. 16, 2, 5, 7, 11, 16, 17; 2s. 6d. each. Exmouth, CIII. 1, 15, 19, 23, 24, 25; CIII. 2, 11, 16, 21; CIII. 5, 4, 5, 10; CIII. 6, 1, 6; 2s. 6d. each. Great Grimsby, XXII. 7, 20, 25; XXII. 11, 2, 8, 9; 2s. 6d. each. Holyhead, V. 14, 23; XI. 2, 5, 19; 2s. 6d. each. Louth, XLVIII. 13, 15; 2s. 6d. each. Llandudno, V. 1, 3, 2s. 6d. each. Slanford, CVI. 8, 10, 14, 15, 20, 25; CVI. 7, 6, 7, 11, 16; 2s. 6d. each. Telford, CX. 7, 11, 12, 13, 16, 17, 18, 22, 23; CX. 10, 5, 10; CX. 11, 1, 2, 3, 6; 2s. 6d. each. Tenby, XLI. 7, 25; XLI. 11, 4, 7, 8, 12, 13, 14, 15, 24, 25; XLI. 12, 11, 16; 2s. 6d. each.

(Stanford, Agent.)

ASIA.

China.—The Famine in ——. Map of the Distressed Districts, with Statistical Notes. Printed and published by Andrew Reid, Newcastle-upon-Tyne, and London. Price 2d.

This map has been published to show the districts of China which are at the present time suffering from famine. It is a rough production, but serves the purpose for which it has been published sufficiently well. On the back of the map will be found some short statistical notes bearing on the same subject.

AMERICA.

British Honduras.—Map showing approximately the Route of the Projected Railway, according to advertisement calling for tenders for construction, from Belize to unite with the Railroad from the City of Guatemala to the Pacific Ocean, by Alfred Usher, F.R.G.S., F.S.I. Scale 1:2,350,000 or 32·1 geographical miles to an inch. F. S. Weller, London.

AUSTRALASIA.

Australien.—General Karte von —. Scale 1:20,000,000 or 274 geographical miles to an inch. F. Handtke, Flemming, Glogau. Price 1s. (*Dulau.*)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in January and February 1889.

No.		Inches.	
1177	m =	6·0	Newfoundland, west coast:—Savage Island anchorage and Old Port au Choix, 1s. 6d.
2851	m =	0·9	Gulf of Mexico:—Rio Grande and Brazos Santiago, 1s.
2145	m =	0·1	Central America, west coast:—Cape Mala to Elena bay, with the northern coast of Chagres to Greytown, 2s. 6d.
961	m =	1·0	Philippine islands:—Basilan strait, 2s. 6d.
1601	{ m =	3·7 }	China, east coast:—Wusung river or Hwang Pu,
	{ m =	6·0 }	Wusung river entrance, 3s.
1239	m =	2·0	New Guinea, south coast:—Hall sound, Vari Vari anchorage, 2s. 6d.
2328	Norway, south coast:—Plan added, Approach to Grimstad.		
627	Africa, west coast:—Plan added, Luash or Ouio bay.		
1109	Red Sea:—Plan added, Anchorage of Raweyah.		
856	New Hebrides islands:—Plan added, Port Ravallec.		
1730	Samoa or Navigator islands:—New plans, Fangafoa bay. Safatu harbour.		
	(<i>J. D. Potter, Agent.</i>)		

CHARTS CANCELLED.

No.		Cancelled by	No.
2851	Rio Grande entrance	{ New Plan. Approaches to Rio Grande and Brazos Santiago ..	2851
2264	Gulf of Panama to Parida	{ New chart. Cape Mala to Elena bay	2145
2265	Parida to gulf of Nicoya	{	961
2145	Gulf of Nicoya to cape Elena	{	1601
961	Basilan channel	{ New chart. Basilian strait ..	961
1601	Wusung, or Wongpu river	{ New chart. Wusung river or Hwang Pu	1601
1734	Sirangon harbour and Johone channel.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. A to P. Index charts (16 sheets). 2549. Ireland, east coast:—Donaghadee harbour. 1492. Adriatic, coast of Italy:—Brindisi harbour. 316. River St. Lawrence:—Seal islands to Orleans island. 956. West Indies:—Guadeloupe to Trinidad. 1013. Africa, west coast:—Cape Lopez to Cape of Good Hope. 1456.

Africa, west coast:—Cameroon river. 840. Bay of Bengal:—Nicobar islands. 1961. China, east coast:—Pescadores islands. 1770. China, east coast:—Kintang channel. 127. Japan:—Hirado-no-Seto to Simonoseki strait. 2657. Japan:—Gulf of Tokio or Yedo. 1020. Australia, east coast:—Danger point to cape Moreton. 1670A. Australia, east coast:—Moreton bay. 2411. New Zealand, Middle island:—Otago harbour. 1508. South Pacific Ocean:—Anchorages in New Hebrides islands.

(*J. D. Potter, Agent.*)

Service Hydrographique de la Marine, Paris.—No. 4307. Mer de Chine, Golfe du Tonkin:—Embouchure et Mouillage Intérieur du Lakh-Yap ou Kua-Mom, 1888.—4246. Tunisie:—Zarzis, Ancienne Gergis, 1888.—4238. Tunisie:—Sfax, Ancienne Taphrura, 1888.—4228. Tunisie:—de Sfax à Maharrès, 1887.—4304. Côte Occidentale d'Afrique:—Mouillage de Cansado et de la Baie du Repos (Environs du Cap Blanc), 1888.—4264. Côte Occidentale d'Afrique:—Baie d'Arguin, 1888.—4251. Mer des Antilles, Ile d'Haïti, Baie Caldera, 1888.—4207. Océan Pacifique:—Archipel de la Société, Ile Bora-Bora (Iles sous le Vent), 1888.—4294. Océan Pacifique:—Archipel de la Société, Ile Huahine (Iles sous le Vent), 1888.—4232. Océan Pacifique:—Ile Rapa, 1887.—4177. Mer des Indes:—Côte Sud de Madagascar du Cap St. Vincent au Farany, comprenant Fort Dauphin, 1888.—Service Hydrographique de la Marine, Paris.

ATLASES.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von ———, 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel, und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Neunte (9) Lieferung. Inhalt: No. 12, Deutsches Reich, Blatt 3 in 1:1,500,000, von C. Vogel. No. 27, Frankreich, Übersicht in 1:3,700,000, von C. Vogel. No. 33, Spanien und Portugal, Blatt 1 in 1:1,500,000 von C. Vogel. Gotha; Justus Perthes, 1889. Price 1s. 6d. each part. (*Dulau.*)

Sheet 12 contains the south-west portion of the German Empire. Sheet 27 is a general map of France in provinces, with the boundaries of departments laid down, each of which is numbered for reference to a list on which its name is given. The soundings are given in contours from twenty metres up to one thousand. All means of communication are clearly laid down, and a plan of the railway system in the environs of Paris is given. Sheet 33 contains the north-west portion of Spain; the same system of giving the soundings as that shown on the map of France is adhered to. In our notice of the 8th issue of this atlas, in the 'Proceedings' for March, an error occurs which we desire to rectify. It is there stated that the soundings are given in various standards of measurement; this, however, is not the case, as they are all given in metres.

Schweiz.—Topographischer Atlas der ———, im Masstab der Original-Aufnahmen nach dem Bundesgesetze vom 18. Dezember 1868, durch das eidg. topogr. Bureau gemäss den Direktionen von Oberst Siegfried veröffentlicht. XXXIII. Lieferung: No. 81, Bauriet; 82, Reinegg; 187, Hochdorf; 203, Emmen; 206, Küsnach; 207, Arth; 239, Rüti; 360, Riaz; 361, Berra; 362, Bulle; 426, Savognin; 497, Brig. Price 12s. 6d. (*Dulau.*)







PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Letter from Mr. H. M. Stanley, on his Journey from Yambuya Camp
to the Albert Nyanza.*

THE public anxiety concerning the Emin Pasha Relief Expedition, caused by the long absence of direct news, was relieved, on the 1st of April, by the arrival in London of the expected letters from Mr. Stanley, referred to at our meeting of February 25th by Sir Francis de Winton. One of these letters was addressed to our Society, and is as follows:—

MARIMI RAPIDS, ITURI RIVER, CENTRAL AFRICA,
1st September, 1888.

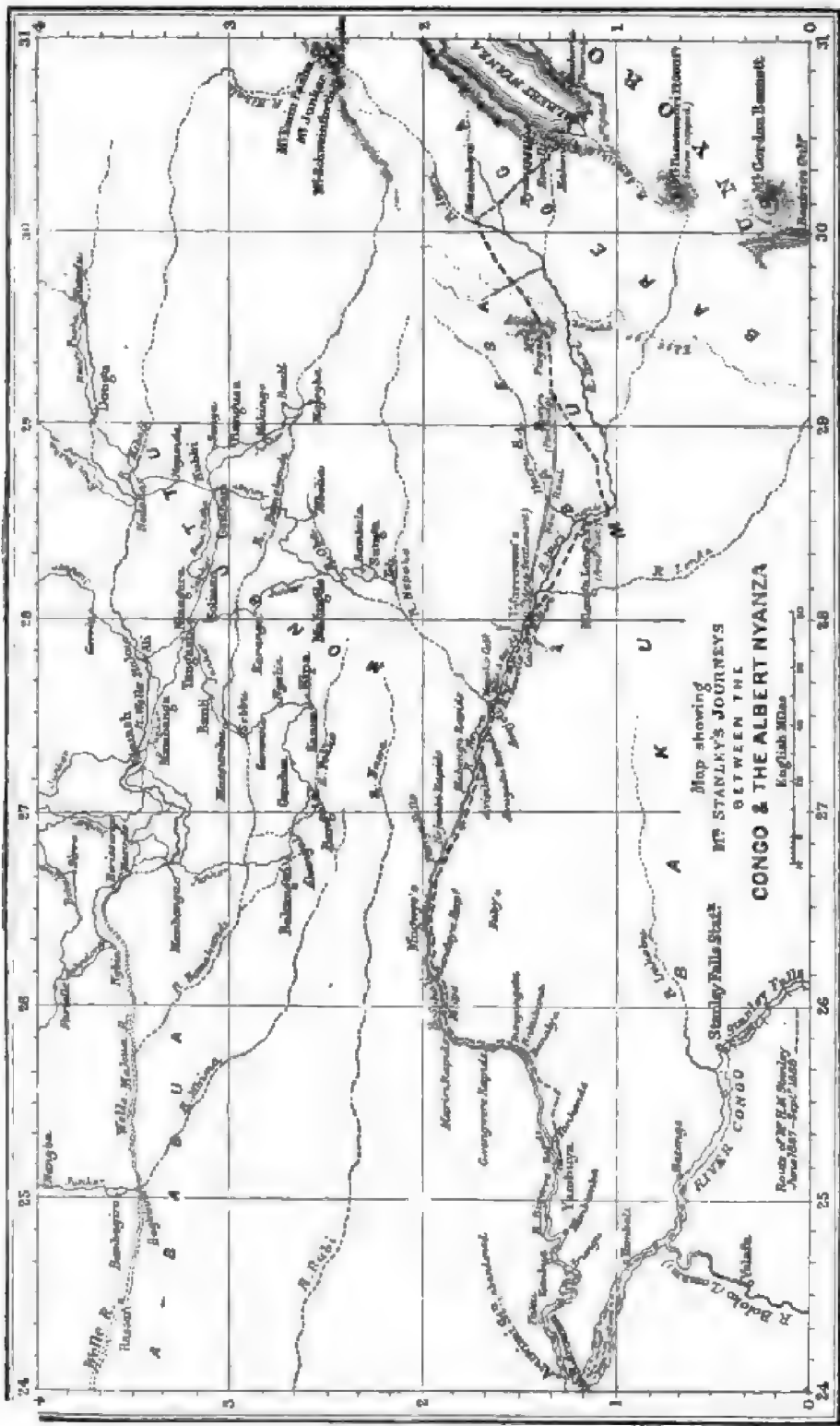
To the Secretary of the Royal Geographical Society,
1, Savile Row, London.

SIR,—I take advantage of the portage now being conducted overland along these Rapids, to give you some geographical details of the New Land lately traversed, and now about to be retraversed by us.

Yambuya, our entrenched camp, is in N. lat. $1^{\circ} 17'$, E. long. $25^{\circ} 8'$; the objective point of the expedition was Kavalli in N. lat. $1^{\circ} 22'$, E. long. $30^{\circ} 30'$. In a direct line the distance is 322 geographical miles. Until we penetrated, and marched through it, this region was entirely unexplored, and untrodden by either white or Arab. For the purposes of this expedition, we should have wished to have known something of it, but we could glean no information respecting the interior, because the natives were so wild, and shy of all strangers.

Having selected my officers and men, my force numbered 389 rank and file. The rest of the expedition was left at Yambuya until the rear column could be collected from Bolobo and Stanley Pool. We bore a steel boat 28 feet by 6 feet with us, about three tons of ammunition, and a couple of tons of sundries, provisions, &c., &c. With all these goods and baggage we had a reserve force of about 180 supernumeraries—half of them carried, beside their Winchesters, bill-hooks to pierce the bush and cut down obstructions. This band formed the pioneers—a most useful body.

The path leading from Yambuya was tolerable only for about five
No. V.—MAY 1889.]



miles, we were then introduced into the difficulties, which more or less would impede our movements and arrest rapid progress. These consisted of creepers varying from one-eighth of an inch to 15 inches in diameter, swinging across the path in bowlines, or loops, sometimes massed and twisted together, also of a low dense bush occupying the sites of old clearings, which had to be carved through, before a passage was possible. Where years had elapsed since the clearings had been abandoned, we found a young forest, and the spaces between the trees choked with climbing plants, vegetable creepers, and tall plants; this kind had to be tunnelled through, before an inch of progress could be made. The primeval forest offered least obstruction, but the atmosphere was close, stagnant, impure, and an eternal gloom reigned there, intensified every other day by the thick black clouds charged with rain, so characteristic of this forest region.

We camped at Yankondó, a populous settlement opposite rapids, on the first day of departure, the 28th June, 1887. Along the river-bank, no path could be found; besides, the river trended too much to the north-east for the course I proposed to take; we therefore cut a path through the manioc fields, and came upon a travelled road leading from village to village inland. In a few days, we became fully initiated into the subtleties of savage warfare. Every art known to native minds for annoying strangers was practised by these natives—the path frequently had shallow pits, filled with sharpened splinters, or skewers, deftly covered over with large leaves. For barefooted people, this proved a terrible punishment. Often the skewers would perforate the feet quite through, at other times the tops would be buried in the feet, resulting in gangrenous sores. We had ten men lamed by these skewers—so efficiently lamed, that few of them recovered to be of much use to us. One of the approaches to every village was a straight road, perhaps a hundred yards long, and 12 feet wide, cleared of jungle, but bristling with these skewers carefully and cunningly hidden at every place likely to be trodden by an incautious foot. The real path was crooked, and took a wide detour, the cut road appeared so tempting, so straight, and so short. At the village end, was the watchman, to beat his drum and sound the alarm, when every native would take his weapons, and proceed to the appointed place to ply his bow at every opportunity. Yet despite a formidable list of hostile measures and attempts, no life was lost, though our wounded increased in number.

After a few days of this work, the path became an elephant track, leading south-east, and south, and south-west. We again changed our course. By compass, we found a path leading north-east and east, and on the 5th July touched the river again, and being free of rapids apparently, I lightened the advance column of the steel boat and 40 loads. The boat proved invaluable, she not only carried our cripples and sick, but also nearly two tons of goods. From July 5th to the

middle of October we clung to the river. Sometimes its immense curves and long trend north-east would give me sharp twinges of doubt that it was wise to cling to it; on the other hand, the sufferings of the people, the long continuity of forest, the numerous creeks, the mud, the offensive atmosphere, the perpetual rains, the long-lasting mugginess, pleaded eloquently against the abandonment of the river until north lat. 2° should be attained. North lat. 2° I put down as the limit; I would prefer to dare anything than go farther north. In favour of the river was also the certainty of obtaining food. Such a fine broad stream as this we argued would surely have settlements on its banks; the settlements would furnish food by fair means or force.

The river retained a noble width—from 500 to 900 yards, with an island here and there, sometimes a group of islets, the resorts of oyster-fishermen. Such piles of oyster-shells! On one island I measured a heap 30 paces long, 12 feet wide at the base, and 4 feet high.

Such a land for flies, insects, and butterflies! The butterflies congregate around me as I write this letter, and flap their wings in approval of this statement. There are clouds of the latter sailing daily up and across stream, which last for hours.

At almost every bend of the river, generally in the middle of the bend—because a view of the river approach up and down stream may be had—there is a village of conical huts—of the candle-extinguisher type. Some bends have a large series of these villages populated by some thousands of natives. The villages of Banalya, Bakubana, and Bungangeta tribes run close to each other along a single long bend. The first has become famous through the tragedy ending in the death of Major Barttelot. An island opposite the site of the Bungangeta villages I occupied to reorganise the expedition which had almost become a wreck through the misfortunes of the rear-column. The abundance found by us will never be found again, for the Arabs have followed my track by hundreds, and destroyed villages and plantations, and what the Arabs spare, the elephant herds complete.

Internecine conflicts of native tribe against native tribe have also taken place—at least numerous old clearings suggest this, and stockades along the river fronts of the villages. So many were these that a large expedition could have been supported by the fields of manioc to which no owner seemed to lay claim.

On the 9th July we came to the rapids of Gwengweré, another populous district. Near here I saw a stratum of oyster shells, covered with three feet of alluvial soil. How many scores of years have elapsed since the old aborigines fed on these bivalves? I should like to know; and what was the tribe's name, and where, if any exists, is the remnant? For waves of wild peoples have come and gone over this land, as over other lands. Indeed, these villages, though so close together, shelter many little tribes of men. At Gwengweré Rapids, for instance, there

are the Bakoka, Bagwengweré, and a little higher up are the Bapupa, Bandangi, and Banali; the tap of a drum alarms all; while inland are the Bambalulu and the Baburu, the latter of whom are spread out over a considerable region. The Baburu call the river Suhali.

The mornings generally were stern and sombre, the sky covered with lowering and heavy clouds; at other times thick mist buried everything, clearing off about 9 a.m., sometimes not till 11 a.m. Nothing stirs then; insect life is asleep, and the forest is still as death; the dark river, darkened by lofty walls of thick forest and vegetation, is silent as a grave, our heart-throbs seem almost clamorous, and our inmost thoughts loud. If no rain follows this darkness, the sun appears from behind the cloudy masses, the mist disappears and life awakens up before its brilliancy. Butterflies scurry through the air, a solitary ibis croaks an alarm, a diver flies across the stream, the forest is full of a strange murmur, and somewhere up-river booms the alarm drum. The quick-sighted natives have seen us, voices vociferate challenges, there is a flash of spears, and hostile passions are aroused.

On the 17th of July, 1887, we camped at this very place where I now write this letter on the 1st September, 1888, 13½ months ago. Beyond Mariri Rapids is a large settlement on the south bank called Mupe; there is another portion of the same tribe located a little higher up on the north bank. Up to this place there is no decided fall of water; the rapids are caused by reefs of rock, through which the river has channelled passages, where the current is like that of a sluice. Conveying as we do such stores of ammunition and baggage, there is a delay of perhaps two days at such rapid, for we have to carry the baggage overland, and either pole or haul the canoes through the rushing currents.

The next rapids are those near Bandeya, which we reached on the 25th of July. Between Mariri and Bandeya Rapids are located the Balulu, Batunda, Bumbwa, and at the last rapids are the Bwamburi. Inland, to the north, are the Batua, and Mabodi occupy the region further east. To the south are the Bundiba peoples, the Binyali, and Bakongo.

Peace among the river tribes is signified by tossing water upward with the hand, or paddle, and letting it fall on their heads. If we believed them, the natives all suffered from famine—there was no corn, nor bananas, nor sugar-cane, nor fowls, goats, or anything else. Exhibition of brass wire, cowries, or beads had no charm for them—because, since they had no food, such kinds of currency were unattainable. Long ago we had surely all died from want had we been so simple as to believe them. In every attempt at barter we suffered from the cunning rogues. A brass rod only purchased three ears of corn—in a short time a fowl rose to five brass rods. To live at all we had to take what we could, for our would-be friends were our worst enemies, because they aided a constant enemy to us—hunger.

miles, we were then introduced into the difficulties, which more or less would impede our movements and arrest rapid progress. These consisted of creepers varying from one-eighth of an inch to 15 inches in diameter, swinging across the path in bowlines, or loops, sometimes massed and twisted together, also of a low dense bush occupying the sites of old clearings, which had to be carved through, before a passage was possible. Where years had elapsed since the clearings had been abandoned, we found a young forest, and the spaces between the trees choked with climbing plants, vegetable creepers, and tall plants; this kind had to be tunnelled through, before an inch of progress could be made. The primeval forest offered least obstruction, but the atmosphere was close, stagnant, impure, and an eternal gloom reigned there, intensified every other day by the thick black clouds charged with rain, so characteristic of this forest region.

We camped at Yankondé, a populous settlement opposite rapids, on the first day of departure, the 28th June, 1887. Along the river-bank, no path could be found; besides, the river trended too much to the north-east for the course I proposed to take; we therefore cut a path through the manioc fields, and came upon a travelled road leading from village to village inland. In a few days, we became fully initiated into the subtleties of savage warfare. Every art known to native minds for annoying strangers was practised by these natives—the path frequently had shallow pits, filled with sharpened splinters, or skewers, deftly covered over with large leaves. For barefooted people, this proved a terrible punishment. Often the skewers would perforate the feet quite through, at other times the tops would be buried in the feet, resulting in gangrenous sores. We had ten men lamed by these skewers—so efficiently lamed, that few of them recovered to be of much use to us. One of the approaches to every village was a straight road, perhaps a hundred yards long, and 12 feet wide, cleared of jungle, but bristling with these skewers carefully and cunningly hidden at every place likely to be trodden by an incautious foot. The real path was crooked, and took a wide detour, the cut road appeared so tempting, so straight, and so short. At the village end, was the watchman, to beat his drum and sound the alarm, when every native would take his weapons, and proceed to the appointed place to ply his bow at every opportunity. Yet despite a formidable list of hostile measures and attempts, no life was lost, though our wounded increased in number.

After a few days of this work, the path became an elephant track, leading south-east, and south, and south-west. We again changed our course. By compass, we found a path leading north-east and east, and on the 5th July touched the river again, and being free of rapids apparently, I lightened the advance column of the steel boat and 40 loads. The boat proved invaluable, she not only carried our cripples and sick, but also nearly two tons of goods. From July 5th to the

The banks of the river, covered with forest from the Congo to the Nepoko, are uniformly low, here and there they rise to about 40 feet; but above the Nepoko, hills begin to crop up more frequently, palms are more numerous, and the woods show the tall, white-stemmed trees so characteristic of the slopes of the Lower Congo. Apropos of these, the natives have a curious way of clearing the woods: they make a platform about 10 or 15, or even 20 feet high above the reach of the buttress, and chop the trees down at that height. A clearing will show a few hundreds of trees thus cropped; and when the bark is decayed, a stranger might fancy, from a first view of the field, that he had come upon a ruined city of temples.

Above the Nepoko, navigation becomes more difficult, rapids are more frequent—there are two considerable falls to be met with. The land rises steadily until about 400 miles above Yambuya the river is contracted into a rushing stream about 100 yards wide, banked by the steep walls of a cañon, though of course in this forest region, woods clothe the slopes and summits. Whatever changes the face of the land may show, the forest covers peak, hill, ridge, valley, plain—everywhere it is continuous, nowhere broken, except at such clearings as man has made.

We braved this stream, wild as it was, for a few days longer, but finally progress became impossible. We emptied canoes and boat of their loads, mustered the caravan, and found we were so physically weak that we could not carry them. Ulcers, famine, dysentery, had sapped the strength of a great number. The whole of October, though we had only about 50 miles to travel, was spent in gaining the settlement of Kilonga-Longa, about 460 miles above Yambuya, sending relief parties back to the survivors of those we had left behind. Had we been a year earlier, say had we started in 1886 instead of 1887, we should have met with plenty of food up to the Nyanza; but the Arabs, or two Arabs and their followers, had devastated a whole region. Fungi and wild fruit sustained us; and those who could not get sufficient of the strange things we lived upon perished, or deserted the starving column to die elsewhere.

You can understand our course hitherto. From Yambuya's position $1^{\circ} 17'$ N. lat., we reached with the winding river $1^{\circ} 58'$ N. lat.; from that point we gradually came south to 1° N. Kilonga-Longa's is in north latitude $1^{\circ} 6'$, and from this point we struck an almost direct line to Ibwiri N. lat. $1^{\circ} 20'$, 3600 feet above the sea, then direct to Mount Pisgah in N. lat. $1^{\circ} 21'$, whence we first caught a view of the grass land.

From Kilonga-Longa's to the base of Pisgah the people are Bakumu and from the south bank of the Ituri to Stanley Falls, on the Congo, the people are known under that term. East of the Ituri, above Kilonga-Longa's, the people are Balesa, while in the forest region. The style of

villages is a single street, flanked by huts connected one with another, of uniform height and make. • One of these villages is like a long, low hut, say 200, 300, or even 400 yards long, sawn from end to end in half—each half removed from the other to make a street between, varying from 20 feet to 60 feet in width.

Having left the regions invaded by the Arabs and their followers in their search for ivory, we fared well, and lived almost sumptuously. Our people regained their lost strength and became men once more, ready and willing to do anything or go anywhere. We showed them the grass-land; with grass they connected cattle, quite a sufficient inducement to spur them on.

June 28th we began our march through the forest, on December 5th we entered the grass-land, a beautiful rolling country. On the 6th we crossed a branch of the Ituri 40 yards broad, flowing from N.N.W.; on the 9th we crossed the main Ituri, 125 yards broad, coming from N.N.E.; on the 10th we crossed another branch of the Ituri coming from E.N.E.; on the 13th we looked down upon the Albert Nyanza from a height (by aneroid) of 5200 feet. This was the highest point of land reached by us, though on either side of this there were points attaining an altitude of quite 6000 feet. And from this highest point there was a sudden drop of 2900 feet to the level of the Albert Lake.

As I may say also that ten minutes' march took us from the head of the stream draining towards the Ituri to the spot whence we saw the Nyanza at our feet, it does not require much imagination to picture the face or contour of the land from this point, down to the confluence of the Aruwimi, or Ituri, with the Congo. It is like the smooth glacis of a fort, and then a sudden drop to the bottom of the ditch; the sloping glacis would represent the valley of the Ituri up to the crest, and then the deep gulf, 2900 feet deep, at the bottom of which is the Lake.

The Aruwimi has many names—the Dudu, Beyerre, Suhali, the Nevva, Nowelle, Itiri, for the last 300 miles of its course, but upward to its source it has a singular, wide-spreading fame under the name of Ituri. The aborigines of the Nyanza—the open plateau and forest tribes down to within a few miles of the Nepoko—all unite in calling it the Ituri.

The main Ituri, at the distance of 680 miles from its mouth, is 125 yards wide, 9 feet deep, and has a current of 3 knots. It appears to run parallel with the Nyanza. Near that group of cones and hills affectionately named Mount Schweinfurth, Mount Junker, and Mount Speke, I would place its highest source. Draw three or four respectable streams draining into it from the crest of the plateau overlooking the Albert Nyanza, and two or three respectable streams flowing into it from north-westerly; let the main stream flow S.W. to near N. lat. 1° ; give it a bow-like form N. lat. 1° to N. lat. $1^{\circ} 50'$; then let it flow with curves and bends down to N. lat. $1^{\circ} 17'$ near Yambuya, and you have a

sketch of the course of the Aruwimi or Ituri from the highest source down to its mouth, and the length of this Congo tributary will be 800 miles. We have travelled on it and along its banks for 680 miles on our first march to the Nyanza, for 156 miles along its banks or near its vicinity we returned to obtain our boat from Kilonga-Longa's, then we conveyed the boat to the Nyanza for as many miles again; for 480 miles we traversed its flanks or voyaged on its waters to hunt up the rear column of the expedition; for as many miles we must retrace our steps to the Albert Nyanza for the third time. You will therefore agree with me that we have sufficient knowledge of this river for all practical purposes.

On the 25th May, 1888, Emin Pasha's Soudanese were drawn up in line to salute the advance column as it marched in file towards the Ituri river from the Nyanza. Half-an-hour after we parted I was musing, as I walked, of the Pasha and his steamer, when my gun-bearer cried out—"See, sir, what a big mountain; it is covered with salt!" I gazed in the direction he pointed out, and there sure enough

"Some blue peaks in the distance rose,
And white against the cold white sky
Shone out their crowning snows;"

or rather, to be true, a blue mountain of prodigious height and mass. This then, said I, must be the Ruwenzori which the natives said had something white like the metal of my lamp on the top. By prismatic compass-bearing the centre of the summit bore 215° magnetic, from a point five miles from the shores of Nyanza. I should estimate its distance to be quite 50 miles from where we stood. Whether it is Mount Gordon Bennett or not I am uncertain. Against the supposition is the fact that I saw no snow on the latter in 1876, that its shape is vastly different, and that Ruwenzori is a little too far west for the position I gave of Gordon Bennett; and I doubt that Gordon Bennett Mountain, if its latitude is correct, could be seen from a distance of 80 geographical miles in an atmosphere not very remarkable for its clearness. I should say that the snow-line seemed to be about 1000 feet from the summit. There is plenty of room for both Ruwenzori and Gordon Bennett in the intervening space between Beatrice Gulf and the Albert Nyanza.

Apropos of the latter lake I am utterly at a loss to conjecture how Sir Samuel Baker could stretch it to such an infinite length to the south-west from the position of the highland or terrace, or knoll above Vacovia or Mbakovia. Its extremest southern point is about $1^{\circ} 11' N.$ lat.; I think about four or five miles at the utmost from the place where he stood. To make matters more complicated he says in his book that the day he viewed it was "beautifully clear." If so, he should have seen that he was merely looking at a shallow bay, some 10 miles wide, and four or five miles deep; that into a tongue of the bay enters the Semliki

river, a southern tributary of the lake, flowing from the south-west through an almost level plain. And if it were a "beautifully clear day," he could not fail to have seen this snowy mountain right before him as he looked towards the south-west. "The blue mountains" also are no other than the slope of the plateau, 5200 feet above the sea, or 2900 feet above the Albert. That remarkable cataract also is only the wet face of sheet-rock, washed by a small stream about 10 feet wide.

Until we stood at N. lat. $1^{\circ} 20'$, looking down upon the lake, I half suspected that Colonel Mason had committed a grievous error in his observations, or that a large bank of mud, overgrown with tall reeds, had prevented him from seeing the lake beyond; but unfortunately for Sir Samuel's huge lake, Colonel Mason has done his work, and mapped the lake so well, that there is nothing left for me but to vouch for the general accuracy of his chart of the Albert Nyanza.

At the south and south-west of the lake there is no mystery. A century (or perhaps more) ago the lake must have been some 12 or 15 miles longer, and considerably broader opposite Mbakovia than it is now. With the wearing away of the reefs obstructing the Nile below Wadelai, the lake has rapidly receded, and is still doing so, to the astonishment of the Pasha (Emin), who first saw Lake Albert seven or eight years ago; "For," he says, "islands that were near the west shore have now become headlands occupied by our stations, and native villages."

Across the lake from Nyamsassio to Mbakovia, its colour indicates great shallowness, being brown and muddy, like that of a river flowing through alluvial soil. Some of this must of course be due to the Semliki river; but while on board the *Khedive* steamer, from Nyamsassio to Nsabi, I noticed that the pole of the sounding-man at the bow constantly touched ground a mile and a half from shore. Near the south end the steamer has to anchor about five miles from shore.

At the south-west end the plain rises from the edge of the lake one foot in 180 feet; the plain of the south end rises at the same rate for about 10 miles; a slight change then takes place as the eastern and western walls of the table-land draw nearer, and debris from their slopes, washed by rains and swept by strong winds, humus of grass and thorn forest, have added to its height above the Lake. Natives say that south of this the plain slopes steeply to the level of the uplands. A shoulder of the western wall prevented us from verifying this, and the beyond must be left until we take our journey homeward.

I look upon the country lying between the Albert Nyanza and the lake discovered by me in 1876 as promising curious revelations. Up to this moment I am not certain to which river the last lake belongs, whether to the Nile or the Congo. I believe to the latter, but what I am sure of is that it has no connection with the Albert Nyanza. The Ruwenzori slopes must supply a large portion of the waters of the Semliki river, the plateau south-west and west must supply the rest.

But it is at the water-parting between the Semliki and some other river south or south-west that real interest begins.

The tribes inhabiting the forest and valley of the Ituri are undoubted cannibals. Between the Nepoko and the grass-land the dwarfs are exceedingly numerous. They are called Wambutti. The Pasha's people with us recognise in them the Tikki-tikki further north. A few only of these people are to be found south of the Ituri. I suppose we saw about 150 forest villages or camps of the Wambutti. They are a venomous, cowardly, and thievish race, very expert with their arrows, as we have found to our cost.

Ugarrowwa, a former tent-boy of Speke's, now grown to be an important man in this region, through wealth unlawfully gathered at the expense of thousands of forest natives, is becoming impatient for this letter. To him I confide it, trusting that it will reach you some time.

HENRY M. STANLEY.

Previous to the reading of the foregoing letter,

The PRESIDENT said the communication about to be read from Mr. Stanley would afford a fresh illustration of those qualities of endurance, resolution, and courage which had always distinguished that traveller, and which have been especially conspicuous during the extremely dangerous, difficult, and prolonged expedition in which he was at present engaged.

After reading the letter,

MR. DOUGLAS FRESHFIELD said it had been determined, in the unavoidable absence of Sir Francis de Winton, and with the object of giving those Fellows who had travelled in Africa, like Colonel Grant and the Rev. Horace Waller, or studied it like Mr. Ravenstein, opportunity for a full study and comparison of the new material placed in the hands of the Society by Mr. Stanley, and also out of justice to the gentleman who had prepared the paper that would follow, to postpone a general discussion of this most interesting contribution to African geography, as well as most stirring tale of adventure, to the next meeting. Detailed comment would not be expected from him, and he would simply ask the meeting to note three points, which had struck him on reading Mr. Stanley's letter. First, they should remember that the idea of reaching the Lake Province from the Congo, and thus linking the two great arteries through which the life-blood of civilisation was destined to flow into the heart of Africa, was first of all General Gordon's, and the hero they all lamented was on the point of undertaking this task when he was sent out to Khartoum. Mr. Stanley had carried out this idea. He had shown how nearly the two great waterways were connected, and how their sources overlapped. Others would find easier ways between them, perhaps to the north of Mr. Stanley's route by the Welle. The first 'comer always had the hardest task; but he had also the chief glory. Next, he would point out that the letter, in its concluding sentences, perhaps pointed out the probable direction of Mr. Stanley's onward and homeward march. He might solve the problems in the country south of the Albert Lake; he might possibly call at Msalala, south of the Victoria Nyanza, for it was known that stores awaited him there a short time ago. Lastly, he asked the meeting to remember all they knew and had heard of Emin Pasha, and not to dishonour him, as some seemed ready to do, by the suspicion that he would leave his province and his post, unless either his task was hopeless, or (which was happily

far more probable), it was so far accomplished, that he had placed the Lake Province, once Egyptian, completely beyond the grasp of the tottering despotism of Khartoum. In the turmoil of politics it might be difficult sometimes to believe in the survival of enthusiasm and the survival of heroism; but it was a mistake to treat enthusiasm or heroism as negligible features in the future of the world or the future of Africa. Africa had furnished many triumphs to Englishmen, for he would not please a small provincialism by denying the title of Englishmen to those Welshmen or Scotchmen who travelled under the British flag. These triumphs had been won by steady and self-sacrificing devotion to a high aim, and that aim, sought by each man in separate ways according to his individual temperament, had been the civilisation of Africa, and the protection of the native races from their worst enemies, the Arab slave-traders.

The Transcasbian Railway. By the Hon. G. CURZON, M.P.

(Read at the Evening Meeting, March 11th, 1889.)

Map, p. 324.

I FEEL a natural diffidence in speaking on the subject of Central Asia in the presence, perhaps, of many who have devoted to this subject long years of study, and have before now given to this Society, and to the public, the outcome of their patient labours; possibly of some who have in earlier times, amid inconvenience and suffering, nay, at great personal risk, explored on horseback or on camel-back the region which it was my comfortable privilege to traverse for the most part in a railway-train, moving at the easy rate of 15 or 20 miles an hour. In comparison with the labours of these students and pioneers, the more recent traveller can tell but a humble and unromantic tale, although the very facility and security of his progress may serve a useful purpose by throwing into more brilliant relief the achievements of his predecessors, as well as by illustrating the marvellous change which an ordered Government and the arts of peace have introduced into a country that for generations, if not for centuries, beforehand was a prey to chronic scourges worse than those of war.

The reason for which, notwithstanding these obvious deficiencies, I am permitted to address you this evening, is this. The old time in Central Asia—what I may describe as the era of the Thousand and One Nights, with its strange mixture of savagery and splendour, of coma and excitement—is fast fading away, and original exploration will soon cease to be possible in a region that has yielded up all its secrets to science. For the moment, however, the new order of things is so new, and its immediate effects are so astonishing, that a narrative of the still incomplete transition may awaken interest; the more so, as owing partly to the obscurity in which, at least to the eyes of the public, the Transcasbian territories have long been plunged, and still more to the very restricted liberties accorded by the Russian Government to English

visitors in those parts, but few of our countrymen have sought, or, if they have sought, have obtained, permission to travel in these recently acquired dominions of the Czar. I was fortunate enough to be one of the first small batch of Englishmen who, not without considerable preliminary difficulty, secured leave in the past autumn to journey along General Annenkoff's new railway from the Caspian to its present terminus at Samarkand. My only claim to speak, therefore, is the modest one of accidental priority in point of time. With this preface I will proceed to my remarks.

Let me say, however, in passing, that I am well aware of that stern and prudent rule of this Society, by which politics and subjects of party contention are rigidly excluded from its discussions. This rule I shall thankfully observe. At the same time I understand by politics, party politics, the stock-in-trade of that fortunate or unfortunate profession to which I happen to belong. From the intrusion of so discordant an element the members of this Society may justly claim exemption. I hold myself at liberty, however, and no one I am sure will deprive me of the right, to estimate the political effects of the new railway upon a country where it has been introduced with avowedly political objects, and in which to discuss it simply as a mechanical structure or as a vehicle for the conveyance of tourists would be an insult both to the importance of the undertaking and to the intelligence of my audience.

Before I ask you to accompany me to the Caspian, or land you upon its melancholy shores, let me give a brief and succinct account both of the inception and execution of this remarkable enterprise. I shall curtail, as far as possible, this part of my remarks, seeing that the history of the railway is probably, at any rate to an audience such as this, pretty well known.

Between the years 1871 and 1879 the Russians, who, in 1869, had landed at Krasnovodsk, on the eastern shore of the Caspian, and from there had made tentative efforts to pacify or subdue the marauding Turkoman tribes of the interior, conducted a series of campaigns, or rather expeditions, principally against the Tekke Turkomans of the Akhal oasis, lying under the shelter of the great mountain range which, with the varying titles of Great Balkans, Little Balkans, Kuren Dag, and Kopet Dag, stretches like a huge wall from the Caspian to the north-east borders of Persia and the confines of Afghanistan. These expeditions, which lacked able leadership, were not generally successful, and finally culminated, in the year 1879, in a disastrous retreat on the part of General Lomakine, who was severely defeated at the Turkoman fortress of Dengil Tepe, or as it is more commonly called Geok Tepe, and compelled to fall back in disorder upon the Caspian. It was evident at headquarters that a more serious and determined effort was required to subdue these turbulent tribesmen. The command was accordingly entrusted to General Skobelev, then in the flush of a fame newly

acquired by feats of generalship and personal heroism in the Turkish war, and *carte blanche* was given to him for whatever preparations he chose to make. The great difficulty, and one of the subsidiary causes of failure in Lomakine's campaign, had been the scarcity and sacrifice of transport animals. In the expedition of 1879, 8377 camels had perished out of 12,273 employed. It was accordingly suggested to Skobelev to build a light line of railway from his base on the Caspian—which he had prudently shifted from Tchikishliar, the previous starting point, to the vastly superior harbour of Krasnovodsk. A service of traction engines was first proposed, and a small, movable, narrow gauge railway was next designed. Presently, however, General Annenkoff, who was then Chief of the Transport Department of the Russian Army, and had had much experience of military transport in the Turkish war, was summoned by Skobelev to his aid, and recommended the use of 100 miles of steel rails, which had originally been bought for the campaign in the Balkan Peninsula, and were lying idle, stored in European Russia. The plan was accepted; the rails were conveyed across the Caspian; a special railway battalion was recruited in Russia; materials were collected; and though Skobelev at first looked upon the scheme as a purely accessory means of transport, and had little idea of what it might ultimately become, though he boldly announced his intention of finishing the campaign long before Annenkoff had finished the railway, and though it was not projected in any case to carry the latter further than to Kizil Arvat, 145 miles from the Caspian, yet the work was steadily and efficaciously persevered with by Annenkoff and his battalion. Skobelev's prediction was realised. On January 24th, 1881, he carried the Turkoman fortress of Geok Tepe by storm, and drowned all further resistance in blood. In December of the same year General Annenkoff fulfilled his part of the undertaking, and the first locomotive steamed into Kizil Arvat. There the terminus remained for three years, a period which was occupied by Russia in completing the pacification of the Turkoman tribes, in assuring her own position, and in exploring and surveying the *terra incognita* that lay to the east, and hid in its mysterious recesses the famous encampment of Merv, and the little known approaches to Herat. These proceedings, as is well known, culminated in the peaceful annexation of the former place, with its surrounding oasis and population, in February 1884, and in the extension of the Russian frontier by rapid stages in the direction of Afghanistan. Finally, in March 1885, while the English and Russian Boundary Commissioners were, after much delay, about to enter upon that demarcation which the border changes, resulting from Russian advance, had recommended as desirable to both Governments, occurred the famous affray between Russian and Afghan soldiers on the Kushk, that so greatly stirred public opinion in England, and all but embroiled the two nations in war. With the possibility of

war on the new frontier, the extension of the Transcaspiian railway in that direction became urgent. It was immediately taken in hand; a second railway battalion was enlisted; General Annenkoff was recalled to the scene of his labours; thousands of Persian navvies and hundreds of Russian soldiers pushed on the work. The crisis itself was soon at an end; but meanwhile the character and conception of the Transcaspiian railway had changed. No longer the prudent auxiliary to an isolated and limited campaign, it became the emblem of a great policy, imperial in its quality and dimensions. It dawned upon the official mind at St. Petersburg that Russia had in her power the means, not merely of enormously strengthening her offensive capacity in the event of war, but also of consolidating her dominions in Central Asia, by linking together the hitherto detached bases of Turkomania and Turkestan, and thus of drawing tight the final coils round the already enfeebled body of the native Khanates. With this object in view the rails were carried forward with steadfast speed. They entered Aaskabad, which had been made the capital of the newly constructed Transcaspiian province and the residence of a Governor-General, in December 1885; they reached Merv, 500 miles from the Caspian, in July 1886. After a brief pause, they were pushed on to the Oxus, 150 miles further, General Annenkoff's employés having laboured so pluckily and so well that 500 miles had now been constructed in seventeen months, or at the rate of from a mile to a mile and a half in a day. The bridging of the Oxus necessitated a pause, and occasioned some difficulty. In January, however, of 1888, the rails resumed their forward race from the right bank of the river; and on May 27th, a triumphal train, decked with flags and crowded with soldiers, steamed, amid the roar of cannon and the playing of bands, into Samarkand, the historic city of Timur, close upon 900 miles from the Caspian Sea. The succeeding months have been spent in putting the finishing stroke to this great work, in building stations, and in improving the permanent way. These operations may be protracted through another year, or possibly two; at the end of which time the railway and its appointments will vie successfully with any cognate undertaking in the world. Such, briefly stated, is the history of the Transcaspiian line.

Before I proceed to trace my advance along each stage of this interesting route, I must ask leave to furnish a few necessary details about the method of construction and the present resources of the line. They will be dull, because they are to some extent technical; but you cannot expect laughter to be evolved out of a locomotive, or romance to lurk in metal rails.

The line is on a five-foot gauge, which is uniform with the railway system of European Russia, but not with that of British India. The rails are of steel, from 19 to 22 feet long, and are laid upon wooden sleepers at the rate of 2000 sleepers to every mile, being simply spiked down without chairs or bolts. Every piece of timber, iron, and steel

employed was brought from the forests or workshops of Russia, for the most part down the Volga and across the Caspian. The sleepers cost 8*d.* apiece in Russia, 3*s.* upon delivery in Transcaspia. The line is a single one from start to finish, except at the stations, where there are invariably sidings, and sometimes triangles, for an engine to reverse; it is laid upon a low earthwork or embankment thrown up with the soil scooped out of a shallow trench on either side. The permanent way is not metalled. Stone for the railway buildings was found in great quantity in the quarries of the Persian mountains; bricks were in some cases collected from the ruined cities and villages that everywhere abound, in others were sun-dried or baked in kilns. The unskilled labour was performed by native workmen—Persians, Turkomans, and later on Bokhariots—who used their own implements and tools, and of whom at one time over 20,000 were employed. The Turkomans were found to be the best labourers; the Persians were the worst, being incurably idle, though strong as oxen. Their wages rose from 4*d.* a day ultimately to 8*d.* Behind the native workmen followed the picked soldiers of the Russian Railway Battalions, each from 1000 to 1500 strong, laying and spiking down the rails. The maximum rate of progress was nearly four miles in the day, and the normal rate over two, though in wind and rain it sometimes sank to half a mile, or less.

General Annenkoff's method of advance was ingenious and effective. The men engaged in laying the line lived in a working train, which accommodated 1500 persons in two-storeyed carriages, and contained also a larder, kitchen, ambulance, smithy, and telegraph wagons. They were divided into two brigades, one of which worked from 6 a.m. to noon, the other from noon to 6 p.m. Twice a day another train came up in the rear from the base, bringing food, water, material, and rolling stock, the latter of which was conducted to the front on a small movable narrow-gauge line laid alongside the main rails, and advancing in their company. The average cost of construction was 4500*l.* a mile, all included, though, as the rails and rolling stock, which amounted to two-fifths of the entire cost, were supplied to General Annenkoff by the Government from Russian workshops, the charge actually incurred upon the spot did not amount to more than 2700*l.* a mile. Additional grants, however, have from time to time been made which ought to be added to these totals. Since the line was opened a further credit of 200,000*l.* has been allowed to General Annenkoff for the repairs and finishing touches before indicated. All considered, it probably deserves to be entitled one of the cheapest railways that has ever been constructed.

Now it has often been claimed that this railway is an astonishing engineering phenomenon, inasmuch as it traverses a country previously believed to be inaccessible to such a method of locomotion. Though I am no engineer myself, yet I say that which has been endorsed by com-

petent engineers when I record my humble opinion that, apart from the local lack of material, due to the appalling dearth of the country, it is probably the easiest and simplest railway that was ever built. The region which it traverses is as flat as a billiard table for almost the entire distance, the steepest gradient encountered being only 1 in 150. There was therefore no difficulty in transporting heavy wagons and bringing up long and loaded trains. Sometimes the rails run in a bee line for 20 or 25 miles without the slightest deviation to right or left. There are no tunnels, and only a few insignificant cuttings in the sand-hills. In a country for the most part destitute of water it is not surprising to find that over a distance of 900 miles only three bridges were required—across the Tejend, across the Murghab at Merv, and across the Amu Daria. Along the best laid parts of the line a speed of from 30 to 40 miles an hour has sometimes been attained; but the far from solid character of the substructure in most parts would render such an experiment hazardous; and for military purposes, in time of war, when heavily charged trains would be following each other to the front, a higher average than 12 or 15 miles could not reasonably be counted upon.

Though I have said that the facilities of the line were great and uncommon, there were difficulties which, though surmountable, were uncommon also. They arose in the main from two causes: the scarcity of water and the superabundance of sand. If in certain parts a slight exchange could have been effected of these two commodities, much labour might have been spared and many hearts would still be gladdened. For the first 110 miles from the Caspian there is no sweet water at all; further on it descends in precarious streams from the Persian mountains, streams so precarious that, whilst during half the year their beds are dry, from time to time there rushes down a cataract that sweeps all before it, tearing up the rails and converting the desert into a lake. One such catastrophe occurred at the opening ceremony, and delayed General Annenkoff's guests many weary hours near Kizil Arvat. But these incidents are fortunately rare.

To meet the scanty supply of water, Artesian wells were sunk, but without any success; sea-water was distilled and condensing machines established. These, however, seem to have fallen into disuse, and water is conveyed to and fro in huge wooden vats standing upon trucks which are attached to the trains. In places where natural sources exist, reservoirs or cisterns have been built, and the water is carefully conducted in conduits from the hills. The prevailing scarcity would, however, be a serious consideration in the event of the transport of large bodies of troops and baggage animals in time of war, unless this occurred at a season when the natural sources were full.

The second difficulty of which I spoke was that arising from the vast and shifting masses of desert sand. A considerable part of the railway,

though it traverses what has the appearance, at least in autumn and winter, of a sandy desert, is in reality laid upon a solid and argillaceous surface, caked over with a coating of marl, which is cracked and blistered by the sun, and is covered with a thin top-dressing of saline crystallisation. In other parts the surface consists of a loose soil, which nourishes tamarisk, camelthorn, and other desert shrubs, and when subjected to irrigation will raise abundant crops of grain. In neither of these cases was any difficulty encountered. The really formidable sands are limited to three districts: (1) The first 30 miles from the Caspian; (2) the stretch between the Merv Oasis and the Oxus; and (3) a narrow belt between the Oxus and Bokhara. Here but little vegetation is either visible or, with certain exceptions, possible; the sand, of the most brilliant yellow hue, is piled in loose hillocks and mobile dunes, and is swept hither and thither by powerful winds. It has all the appearance of a sea of troubled waves, billow succeeding billow in melancholy succession, with the sand driving like spray from their summits, and great smooth-swept troughs lying between, on which the winds leave the imprint of their fingers in wavy indentations, just like an ebb tide on the sea-shore. These were the conditions that presented the only really formidable obstacle to the military engineer. They were overcome, or at least resisted, by the employment of several means. Near the Caspian the permanent way was soaked with sea water so as to give it consistency; in other parts it was covered with a sort of armour-plating of clay. Elsewhere, and in the more desolate regions, other plans were adopted. Light wooden palisades, three or four feet high, made of pine laths, were driven into the tops of the dunes and formed a barrier against which the winds might pile the sands with impunity. Nurseries for suitable desert plants were started in the Persian Mountains, and the product of these, tamarisk, wild oats, &c., were planted on the sand-hillocks contiguous to the line. Here, too, was planted that strange and interesting denizen of the wilderness the *Saxaoul* (*Haloxylon ammodendron*), which with a scanty and often ragged uppergrowth, strikes its sturdy roots deep down into the sand and somehow or other derives sustenance from that to which it gives stability and permanence. Fascines of the branches of this plant were also cut, laid at right angles to the rails along the edge of the earthwork or embankment, and covered over with a layer of sand. In spite of all these precautions the sand must always constitute a serious danger to the line, and when the hurricanes blow, which are common at certain times of the year, the rails in the regions I have indicated will always be liable to be blocked, and can only be kept clear by relief parties of workmen sweeping it away as fast as it accumulates.

Before I finish these technical details, let me add that the engines are heated, and the stations, telegraph offices, &c., are lighted by the refuse from distilled petroleum, which is found in the country itself in

considerable quantities, but is brought at an even cheaper cost from the prodigious oil fields of Baku. Large reservoirs of this residual naphtha are kept at many of the stations, and it is transported along the line in cistern cars containing 2400 gallons each. The tenders for this year specified the total amount required as 6,000,000 gallons. Of the existing rolling stock I received slightly differing figures; but I shall be approximately correct if I say that there are at present from 100 to 150 locomotives, and from 1500 to 2000 wagons. As regards passenger traffic, which is of course a purely secondary consideration, there are no first class carriages; a limited number of excellent second class carriages exist; but if you do not chance upon one of these, you may be consigned to a van with an improvised bench down the middle. The cost of a second class ticket from Uzun Ada to Samarkand is 38 roubles, or £3 16s., i. e. at the rate of only 1d. a mile. Regular trains run daily from the Caspian to the Oxus; twice a week beyond. The entire journey from Uzun Ada to Samarkand without a break occupies at present seventy-two hours, or three days and nights for 900 miles, i. e. an average of about 12 miles an hour, including halts. There are sixty-one stations in all, varying from substantial structures in brick and stone to dingy wooden shanties half buried in the sand. Very decent refreshments are obtained at many of them, and the train seems only too anxious to find excuse for long and irritating halts. The tedium of these delays may be relieved by the consumption of magnificent water melons at less than 1d. apiece, or of grapes costing the third of a farthing per lb.

Perhaps what strikes a stranger most in connection with the line itself, is the strikingly military *personnel*. Not only was the railway originally designed as a strategical undertaking, entrusted from the start to a lieutenant-general, and laid by privates of the Russian army, but the working staff is to this moment almost wholly military in character. Civilians have been and are still employed as engineers and architects; but the bulk of the staff is composed of soldiers of the line. The engines are in many cases driven by soldiers; the station masters are officers or veterans who have been wounded; and the guards, conductors, ticket collectors, and pointsmen, as well as the telegraph and post office clerks, are soldiers also. It cannot be doubted that this peculiarity contributed much to the economy of original construction, just as it now does to the efficiency of daily administration.

From these technical details, which I fear may have wearied many of my hearers, I now pass to a record of my journey, in bringing which before you I shall be greatly assisted by the lantern slides which have been prepared from photographs, and by the excellent and accurate map which we owe to the skilful hand of Mr. Sharbau. I shall give a general description of the country, and shall merely invite your special attention to places of peculiar interest, reserving for the end such

remarks about the political, commercial, and strategical advantages of the Transcaspien Railway as my observations suggested.

From Baku to Uzun Ada, the present landing-place and starting-point of the line, is a journey by steamboat of some twenty hours, a crossing which might easily be reduced by several hours. The eastern shore of the Caspian presents a monotonous succession of yellow sand-hills, framed between the parallel blues of sky and sea. At the end of a bay studded with sandy islets are seen the projecting piers of Uzun Ada, or Long Island, a mushroom settlement of plank sheds and huts, surrounding the railway terminus and busy wharves. Uzun Ada is the second but not the final starting-point of the Transcaspien Railway. Its original base was Michaelovsk, 16 miles further up the bay. The shallow water there, and consequent need for the use of lighters, suggested to Annenkoff a move to the superior anchorage of Uzun Ada. Here, however, it is found that the bay silts up rapidly, and that there is a still insufficient depth of water. Accordingly a commission has reported in favour of a move to the original harbour of Krasnovodak, where there is excellent anchorage, although fifty additional miles of rails will in consequence be required. The change may be postponed for a time, but sooner or later it will take place. Uzun Ada, with its scorching temperature and its rickety structures, is a spot which the traveller leaves behind him without regret, and which, when its doom is pronounced, will vanish from existence unwept and unhonoured, if not altogether unsung.

The tract of sand-hills that immediately follows I have already described, nor need I detain you over the mountain ranges of the Great Balkans and Little Balkans, whose features are well known. A little later we find ourselves in a desert expanse, sweeping from a magnificent and abrupt mountain range, at the distance of only a few miles from the railway, on the south, to a far horizon on the north. The mountains are the Kuren Dag and Kopet Dag, the Persian border range, rising from 1500 to 5000 and even 6000 feet in height. The desert is the famous Kara Kum or Black Sand, that stretches from the Caspian to the Oxus, and from Khiva to Khorasan, and the horrors of which were vividly realised, and have been scarcely less vividly described, by Vambéry and other early travellers. Its superficial features I have indicated in an earlier part of my paper. Geologically it has been demonstrated by the numerous mollusc fauna that are found in the sand to have once been the bed of the sea; and the desiccated gulfs and channels by which its surface in parts is scarred, and which have afforded an innocent pastime to an entire generation of theorists, are now generally recognised as marking the ancient shore-line. The whole of this region was originally part of the Aralo-Caspian basin, the loamy bed of which has by the action of winds been turned into a sandy wilderness. I do not believe there would be any very general objection

to a resumption of what in diplomatic language is known as the *status quo ante* on its part.

To the hasty traveller this great plain, though fatiguing in its endless and utter monotony, is not without features of a certain interest. Animal life finds few visible representatives but an occasional crow or a camel browsing on the meagre tufts of herbage. Clustered here and there are to be seen the *Kibitkas* or circular tents of the Turkomans, made of bands of felt wrapped round a wicker framework. But these, which represent the peaceful life of the present, cannot be compared in number with the small clay watchtowers dotted about like pepper-pots all over the expanse, and the rectangular walled forts and enclosures which recall the fierce unsettled existence, the dreaded *alamans* or raids, and the turbulent manners of the past. As we pass groups of swarthy rustics, almost overshadowed by their huge sheepskin bonnets, it is difficult to realise that we are gazing upon the famous man-eater of the desert, the dreaded moss trooper of the Persian Hills. Occasionally are to be seen great circular barrows called *kurgans*, which are supposed to be either the milestones of forgotten nomad advance or cairns raised over the still more forgotten dead. Ever and anon a solitary sand column raised by a passing puff of wind starts up, and giddily revolving on its fragile axis, speeds away over the plain. In the distance a perpetual mirage trembles above the heated surface, and converts the dismal wilderness into luscious lakes of water and floating islets of trees.

The desert expanse which I have been describing extends, roughly speaking, along the northern base of the mountains for 300 miles, but is broken by two so-called oases—those of Akhal-Tekke, from Kizil Arvat to Askabad, and of Atek at the mountain base from Lutfabad to Dushak. According to English ideas the word oasis is here almost a misnomer: for an oasis merely signifies a portion of the desert reclaimed by water for the service of man, and used for purposes either of agriculture or of horticulture. Geologically this fertile zone consists of alluvial soil which has been washed down from the face of the mountains, and whose productiveness depends upon the extent of its permanent water supply. This varies enormously in different parts; and according to its greater or less bounty, the land is converted into gardens and orchards, where are grown melons, mulberries, peaches, and vines; or into fields, producing wheat, barley, clover, rice, maize, and lucerne. In the early spring there is a sudden and almost magical efflorescence of bright prairie flowers; but these soon succumb to the scorching suns of summer, and all too soon, the abomination of desolation sets in.

It is only fair to add that the Turckmans themselves are unaware that so gloomy an impression can at any time be conveyed by their country. They have a proverb which says that Adam, when driven from Eden, never found a finer place for settlement than Akhal. It

does not say, though, that he *did* settle there: and for this unexpected modesty we may be grateful.

The extremes of climate in this region are great, and at times appalling. In the summer the heat is that of a seven times heated furnace; in the winter the cold is Arctic, and the country is often buried under feet of snow. This last winter has been one of uncommon severity; and it is no rare thing to hear of men being frozen to death.

Beyond the shrubs and thorny plants which I have mentioned, the Turkomanian flora is scant and uninteresting. The fauna presents more numerous species, there being abundance of game in the jungles and reeds that border the rivers and swamps further to the east, such as wild boar, cheetah, hare, wolf, and even tiger; and among winged game, pheasants, partridges, and every variety of wild fowl. On the open desert are sometimes found wild asses and gazelles, while the cracks on its blistered surface are alive with lizards, scorpions, spiders, and snakes. The domestic animals are camels, donkeys, horses, and sheep.

Having thus indicated the main features of the country through which I am about to conduct you, I will now call your attention to particular spots. The first place of any historic interest to which we come is the station of Geok Tepe, which stands within 60 yards of the mouldering clay ramparts of the famous fort that beat off the attack of Lomakine in 1879, and only succumbed, after a three weeks' siege, to the assault of Skobelev in January 1881. Its crumbling grey walls, looming up like a railway embankment from the plain, survey now a very different scene from the time when they sheltered a mass of 40,000 Turkomans, making their last heroic stand for freedom against the cannons and rifles, the dynamite and gunpowder, the trained European soldiers and methods of the Great White Czar. The entire enclosure, which is still fairly perfect, measured two miles and 1275 yards in circuit; and the walls of rammed clay, though falling to ruin, and though stripped of their upper half immediately after the capture, in order to cover the bodies of the thousands of slain, are still on the average about 12 feet high. In their face are to be seen the holes scooped out by the shells which embedded themselves uselessly in the earthy mass; and on the side nearest the line are still the two breaches which were torn by the Russian mines, and through which the troops rushed to the assault. Clambering up the ruined bank, I found that it consisted of a double wall the whole way round, or rather of a single wall of enormous breadth, between the lofty battlements of which on the top was a place where men were placed to fire at the besiegers, and where, when the fortress was stormed, many of them were found sitting as they had been shot, perhaps days before, with their bodies pierced by bullets, and their heads fallen forward between their knees. I heard a story which illustrates the profound impression that was stamped upon

the Turkoman memory by this crushing disaster and the horrible carnage that ensued, which combined have left them ever since as powerless as babes. When the assault was ordered by Skobeleff, the Russian troops advanced against the breach with colours flying and bands playing. Five years later, when the inaugural ceremonies at the opening of the railway were being held at Askabad, no sooner did the military music begin, than the Turkoman women and children began to raise loud cries of lamentation, while the men threw themselves on the ground with their foreheads in the dust.

The next place to which I call your attention is the flourishing town of Askabad, which contains barracks for 4000 soldiers, and a population, the garrison included, of 10,000 souls. It is the capital of Transcaspia, and residence of the Governor-General, General Komaroff, the hero, or at least the principal actor, in the memorable affray on the Kushk in March 1885. Askabad is a flourishing though an uninteresting place, possessing European shops and establishments, droschkies in the streets, and positively—rare amenity in Transcaspia—an hotel! In the kingdom of the blind we know that the one-eyed man is king. In Transcaspia, accordingly, Askabad is considered the acme of *luxé* and civilisation.

Its military importance consists not merely in the fact that it is the headquarters of the Transcaspian army, but also that it is the starting point of a new military road, which the Russians have constructed over an easy pass in the mountains to the Persian frontier, whence it is to be continued to Meshed, and ultimately perhaps to be replaced by a line of rails. This will be the future line of advance in the event of any movement against Khorasan.

After Askabad, the line, still skirting the mountains, passes Gyaurs and Baba Durmaz, which people in England were once foolish enough to believe could remain the frontier outposts of Russia in Central Asia, and so arrives at Dushak, which is of some importance as marking the southernmost station of the present line, and the point therefore whence any extension might be expected to start in the direction of Herat. Opinions are divided among the Russians as to whether this is the line that should be pursued, *viâ* Sarakhs and Pul-i-Khatun; or whether a branch should be conducted from Merv, *viâ* Penjdeh, and the Kushk. M. Lessar's surveys in 1882 and 1883 seemed to favour the former route; but I understand that he is himself now a convert to the latter, which accordingly we may expect sooner or later to see adopted.

I do not pause here to discuss the question whether the line so extended, shall ever or should wisely be united to the Indian system of railways, by a junction in Afghanistan, because it is not, for the present at any rate, a practical question; and the more it is regarded, the more difficult and dangerous it seems. For the nonce, we may dismiss it as the amiable hobby of an unimportant minority.

At Dushak, the railway turns at an angle towards the north-east, and leaving behind the splendid mountain barrier, which so long an experience has endeared to our vision, strikes across the Tejend oasis in the direction of Merv. The Tejend, as every one knows, is the name for the lower course of the Heri Rud, which flows from the heart of Afghanistan under the walls of Herat, and finally loses itself in a marshy swamp in the Kara Kum. We cross the river by a wooden bridge from 80 to 100 yards long, and plunging again into the desert, do not emerge from it until just before gliding into a station that bears the historic name of Merv.

When O'Donovan rode into Merv on March 1, 1881, after following on horseback much the same route from the Persian frontier as we have been doing by rail, he confessed to a sense of disappointment at finding the domes and minarets of the great city of his imagination dwindle into a couple of hundred huts placed on the right bank of a scanty stream. We can profit by his and others' experience. We know that Merv is no longer a city, but merely a site; that the old Merv, or Mervs, of the glories and the sieges and sacks of which ancient poets and historians loved to tell, is now a shapeless mass of ruins lying some miles away in the desert; and that since the Russian occupation the Turkoman settlements have been scattered over the oasis. But for all this, the traveller who has read and heard tell of Merv since infancy, until a halo of romance seems to environ the name, cannot resist a shock of sad surprise as he finds himself in a very embryonic and rickety Russian town with some station buildings, two or three streets of irregular wooden houses, and nothing more. It is true that on the other side of the Murghab—when I saw it a very muddy stream flowing in a deep bed between lofty banks, and crossed here by Gen. Annenkoff's second bridge, 60 yards long—one observes looming up the huge earthen walls of the fortress of Koushid Khan Kala, in which the Merv Tekkes thought in 1881 that they were for ever going to resist the invading "Ouroussi." But these have to a large extent been pulled down, or have fallen into decay: the railway now steams right through the enclosure, and the romance is hardly restored to it by the discovery that it contains several unimpeachable whitewashed dwellings of European appearance, which are in fact the Russian official quarters and edifices, and comprise the residence of Colonel Alikhanoff, Governor of the Merv Oasis, and general Warden of the marches along the Afghan frontier, of the colonel of the garrison, and others, besides a small Russian church.

The town of Merv, so far from increasing, is at present diminishing in numbers. In 1886, when it was the headquarters of the railway battalion, there was an artificial inflation of business and population, and the total reached 3000. But since the railway has moved on, this fictitious importance has died down, and the numbers are now probably

less than 1000. In time to come, when the schemes at present being executed for scientific fertilisation and planting of the oasis have been fully developed, its central position, its abundant water supply, and its rich soil, may again create a settlement worthy of the name. The district has been made over to the private purse of the Czar—a wise step, as it affords some guarantee that its improvement will be earnestly taken in hand, and that its revenues will not be allowed to result in loss to the exchequer of so economical a monarch.

The present interest of Merv to strangers consists largely in the fact that it is the residence of Alikhanoff, a Mussulman of Daghestan, who, after a chequered career, has made himself a great name and position in Central Asia, and will be heard of by the British public again; and that he is always surrounded there by some of the Turkoman militia, whom Russia, abandoning her old policy of not giving military employment to the native tribes, has latterly begun to enlist. There is great competition among the Turkomans to join this force which, in the absence of their old life of raid and rapine, supplies the only vestige of excitement left to them, and gratifies their love of horse-flesh and adventure. At present they only number 300; but this total could be almost indefinitely increased, as the Russians only have to supply them with rifles and swords, and each man provides his own horse and kit. Among their officers are several men who fought against Skobelev at Geok Tepe. Makdum Kuli Khan, the commander on that occasion, is now a full colonel in the Russian army, and Governor of the Tejend oasis. The four khans of Merv are also Russian majors or captains, and sport Russian decorations with much pride. The spectacle of these individuals and of the Turkoman militia generally is one that reflects great credit upon Russia's powers of speedy fraternisation and assimilation with her conquered foes.

Ten miles after leaving the modern Merv, the railroad runs through a positive wilderness of ruins, mosques, fortresses, towers, domes, caravanserais, and courts, stretching for miles in tumbled confusion to the horizon. There is not a perfect building, or scarcely a square yard without some relic. These are the remains of the three ancient Mervs, the eldest of which is attributed to Iskander or Alexander the Great, and the youngest of which was destroyed a hundred years ago. Here possibly is a great field for the archæologist; but it is one upon which I should hardly be justified in expatiating before this audience. I will therefore pass on. The Merv Oasis covers an area of about 1600 square miles; and its present population, which has been grossly exaggerated in English writings, is not much more than 100,000 souls. Compared with the previous oases of Akhal, Atek, and Tejend, it is well worthy of the name. I saw here greater cultivation, a richer growth, and more peasants in the fields than at any earlier stage of my journey. But if the oasis is more fruitful, *en revanche* the desert by which it is succeeded,

and which extends for 100 miles to the Oxus, is more appalling. East and west and north and south stretches a troubled ocean of sand, each wave arrested as it were in mid career, when just curving to fall. I never saw anything more melancholy than this wilderness with its sickle-shaped dome-like ridges of sand, succeeding each other with the regularity of infantry files. Each has the appearance of being cloven through the crown, the side facing towards the north-east, whence the prevailing winds blow, being uniform, convex, and smooth, while the southern face is vertical and abrupt.

At last we come to the Amu Daria or Oxus, the Gihon of Genesis, "that encompasseth the whole land of Ethiopia." The river-bed here, i.e. the depression which is from time to time covered by the water, is from two to three miles in width, though in summer, when swollen by the melted snows of the Hindu Kush and the Pamir, the inundated extent will amount to five miles. When I crossed it the stream was unusually low, sandbanks and mud flats projected above the surface, and the main channel cannot have been much over a quarter of a mile broad. The colour of the water is a very dirty coffee-hued brown; but it is extremely healthy and can be drunk with impunity.

General Annenkoff was very much puzzled how to carry his railway across this formidable obstacle, the more so as the bed is constantly shifting and the channel has a tendency to move to the east. At first it was proposed to convey the railway across on a kind of steam ferry worked by a cable, to be fixed on an island in mid-stream. But a wooden bridge was finally decided upon, the moderate cost of only 30,000*l.* being the chief recommendation. This bridge is constructed in four sections over the four different branches of the river, separated by islands; the united length is over 2000 yards; and it rests upon more than 3000 piles, which are driven together in clusters of five into the bed of the stream. The level of the rails is about thirty feet above low, but only five feet above high water. The main part of the bridge—every piece of timber having been brought the whole way from Russia—was put up in the extraordinarily brief period of 103 days. Our train crawled very slowly across and occupied fifteen minutes in the transit.

This bridge, though unquestionably a remarkable achievement, cannot be regarded as otherwise than a temporary structure. The chief danger to which it is exposed is that of fire resulting from a falling spark, to meet which six fire stations are established on the top. A succession of high floods would probably undermine and might sweep it away. Later on it will have to be replaced by a more solid iron fabric, the cost of which, according to the character of construction, I have seen estimated at figures varying from 250,000*l.* to 2,000,000*l.* sterling.

Having crossed the Oxus we find ourselves in the Khanate of

Bokhara. I do not know that a traveller in the Deccan feels any peculiar excitement when he passes from the territory of British India on to that of the Nizam of Hyderabad. There is no perceptible difference. Neither is there between Russian and Bokharan lands in Central Asia. It is sometimes assumed in England that invasion of Bokhara or rebellion in Bokhara are possible factors in the Eastern Question. I think that such views are utterly mistaken.

Independence in Bokhara is a thing of the swiftly vanishing past; mutiny is scarcely a likelihood, even of the present; invasion is an impracticability in the future. The Amir, educated at St. Petersburg, and wearing Russian orders, is a puppet in the hands of the Governor-General of Tashkent. Bokhara is a mediatised state, and for all practical purposes may be regarded as part of the Czar's dominions.

As we advanced further into the khanate a new country spread before us. It displayed the exuberant richness, not merely of an oasis or reclaimed desert, but of a region long and habitually fertile. Great clumps of timber afforded a spectacle unseen since the Caucasus, and large walled enclosures overtopped with fruit-trees marked the country residences of Bokharan squires. Sixty-six miles from the Oxus, the station of Bokhara is reached; though this was, for political reasons, established at a distance of ten miles from the native city, the minarets and domes of which are visible some time beforehand, over the distant trees.

I wrote in the *Fortnightly Review* of January last an account of the city of Bokhara and its present political and commercial position, and will, therefore, not repeat myself here, merely venturing to refer such of my hearers as are interested in this once fanatical and inaccessible and still romantic city, to the pages of that magazine. Here I will only say in passing that nowhere will the effect of the Transcaspien Railway be more felt; nowhere, indeed, has it already wrought a greater revolution, than in this ancient centre of commerce and industry. Russian wares and manufactures already flood the Bokhara shops; Bokharan wares will reciprocally find their way across the Caspian to the counters of Europe, where, for the most part, they are completely unknown. Commercial reciprocity will foster political assimilation; and in another decade Bokhara will be as civilised as Tunis, and less reactionary than Damascus. The new Russian town which is about to be raised round the station buildings, and which will contain barracks, the residency of the diplomatic agent to the court of the Amir, warehouses, and bazaars, will assist this consummation by its proximity to the railway, and will attract to itself much of the importance as well as of the population of the native city. The rapid Europeanising of the latter is attested by a fact which I saw stated in the newspapers the other day, viz. that a Christian and an Englishman had been permitted to ascend the *Minari Kalian*, or Great Minaret, whence public criminals are hurled down for

execution, and which, hitherto, no unbeliever has been suffered to mount. The rumour, also in the newspapers, that the Amir of Bokhara has sent an embassy to the Czar asking him to evacuate and restore Samarkand is as absurd as the other tale is significant.

Bokhara is separated by 150 miles of rail from Samarkand, the famous capital of Tamerlane, and in its day the most splendid city in the East. Watered by the Zerafshan or Gold-strewer, the basin in which it lies, shut in by snowy mountains, contains a veritable Garden of Eden. Fields are less frequent than orchards, and these, giving a return seven times more profitable than that from agriculture, produce grapes, figs, peaches, mulberries, apricots, plums, pomegranates, and pears. For twenty years Russia has held this fertile province, the value of which consists not merely in its intrinsic richness, but in the control which it gives her of the water supply, and hence of the very life of Bokhara, which is fed by the lower courses of the same river.

Samarkand is the present terminus of General Annenkoff's railway, close upon 900 miles from Uzun Ada. It consists of two quarters, the Russian and the native. The former is in delightful surroundings, being completely buried in trees, and intersected by broad boulevards planted with avenues of poplars and acacias, and bordered with rivulets of running water. Its population is about 6000. Of the native town, the numbers of which are about 34,000—with its majestic ruins (the finest in Central Asia), its mighty college gateways, its glazed and glittering arches, its leaning minarets, its world-famous sepulchre of the Conqueror, and its fluted and enamelled domes—I shall say nothing, because they have been amply and admirably described in works such as that of Mr. Schuyler, which are accessible to any hand.

Having brought my hearers to the ultimate point of my journey by rail, though I proceeded farther by other means, I will now invite their attention for a few moments to the future of the Transcaspien line, and to its political, strategical, and commercial effects.

That the railway will long be confined either to its present scope or destination I do not believe. It is natural and almost necessary that it should be continued to Tashkent, the Russian capital in Central Asia, and residence of the Governor-General of Turkistan, 190 miles to the north-east. Commercial and military reasons both recommend this extension. Tashkent has hitherto been dependent upon the laborious caravan routes across the Kirghiz Steppes from Orenburg. Transport along these occupied at the quickest from four to six weeks, and sometimes in the winter four or five months. Already both the import and export trades of Ferghana and Turkistan have been diverted to a considerable extent to the railway, and when the latter has been continued to Tashkent it will monopolise the whole. Not the least important of its effects will be the stimulus that may thus be given to the cotton-planting industry of Turkistan, which has already attained large dimen-

sions, and to which the Russians look in the future to render themselves wholly independent of foreign supply. For military reasons the junction by rail of Tashkent, which is the headquarters of the Turkistan army, with the southern provinces, is also a desirable step for the Russians, with a view to any future concentration of their forces along the Oxus for operations either on the Afghan frontier or in Afghan Turkistan. The engineering obstacles that confront the extension are few. I travelled over the intervening tract, and did not find it more difficult than other regions which the railway had already conquered. Two important bridges, however, would be required over the wide and rapid stream of the Syr Daria or Jaxartes and over the straggling currents of the Zerafshan. When the line has been prolonged to Tashkent it will be time to talk about a connection with the projected Siberian system and about branch lines to Kokand, or even to Kashgar.

Of the southerly extension from Merv in the direction of Herat I have already spoken. Whether priority is given to this or to the Tashkent plan will depend partly upon the ascendancy at St. Petersburg of the war or peace party, partly upon the state of the political atmosphere along the Afghan border. In the event of probable or certain war, I anticipate that the Herat branch would be quickly pushed forward, at least to Penjdeh, a work involving no difficulty. Its prolongation to Herat itself would depend upon circumstances as yet in the womb of time, and which I shall do well not to predict. If peace seems assured, we may expect the next year at least to be devoted to the improvement and completion of the existing line.

A further branch has sometimes been talked of from Tcharjui along the southern bank of the Oxus to Kerki, or to Bosaga, the frontier post on the river between Russia and Afghanistan. For a time it was hoped that the navigation of the Amu Daria by a flotilla, which has been partially constructed at Tcharjui, would supply the requisite means of advance in this direction. But the difficulties arising from the channel have practically defeated this scheme; and I have read in the last few weeks in connection with the panic that has been manufactured out of the movements of Abdurrahman Khan, that a railway continuation to Bosaga is now projected. Such a line could only have a strategical object, and would amount to a military menace to Afghan Turkistan.

I pass now to political consequences. These are great and conclusive. When Russia first advanced into the heart of Central Asia she did so from the north; her objective was the Khanates of the middle zone, and she attained her object with the capture, in 1868, of Samarkand. At a later date she commenced, tentatively and blunderingly, from another quarter, viz. the Caspian Sea. Ambition, nature, necessity, gradually tempted her on till presently she found herself in possession of a twofold dominion—the one in Turkomania, the other in Turkistan. General Annenkoff's railway has linked together and consolidated the two. The

surviving Khanate of Bokhara, now between the hammer and the anvil, can be moulded and flattened like soft metal at her will. The last hope of independence has gone. Gone, too, is the once cherished illusion that the Turkomans would ever rise against her will. Cowed and shattered by Geok Tepe, pacified by a subsequent policy of fraternisation, and conciliated by easy laws and light taxation, they have become resigned and willing subjects of the Czar; and the question is not so much what Turkomans, if any, within the present border will renounce their allegiance, as what Turkomans outside it, in Persia and Afghanistan, will step over and claim to give the same. In a word, the construction of the railway means the absolute and final russification of the middle zone of Central Asia from Khorasan to Khiva, and from the Caspian to Samarkand. The significance of the change is attested by the fact that Transcaspia, has already been made a governor-generalship and independent of Turkestan, while rumours have been heard of a possible severance from Tiflis, to which it has hitherto been subordinate, and of future responsibility to the Czar alone.

The military and strategical consequences of the line are so obvious as to be perceptible even to a civilian. They may roughly be classified under three heads—effect upon Persia, effect upon Afghanistan, and effect through Afghanistan upon India and Great Britain. Into the Persian question I will not enter. I will merely point out that Russia, already established at the neck of Khorasan by her naval station at Ashurada, off Astrabad, has now established herself in force along its entire flank. For over 200 miles the railway runs parallel with the Persian Mountains. The crests of these, and often the valleys on the other or southern side, are in Russian hands. At more than one point she has constructed military roads across the ridge. Pouring troops along these flank lines into Khorasan, and tightening her grip round the throat between Astrabad and Shahrud, where with a small force she could cut off all connection with Teheran, she has it in her power to annex that rich and magnificent province to-morrow, and will some day do it, if the pear does not fall of its own accord from the tree. It will be well if politicians and soldiers in this country should begin to prepare themselves for the Russians at Meshed.

Briefly stated, the effects of the line upon the Afghan Frontier Question, and therefore indirectly upon this country, are these. Firstly, it enables Russia upon the outbreak of war, to place a considerable local force without delay in the near vicinity of the frontier and of Herat. Secondly, it enables her to bring supplies for that force from the Caspian. Thirdly, it enables her to reinforce it by the military resources of the Caucasus and of European Russia, transported from Baku and Astrakhan. Fourthly, turning our eyes in the opposite direction, it enables her Turkistan army, which has hitherto been almost useless for such service, to co-operate with the Transcaspian column

either at Merv and along the north-west Afghan frontier, or to execute an independent diversion in the direction of the Oxus and Balkh. It will thus be seen that from either direction, General Annenkoff's railway has prodigiously increased the military strength of Russia, inasmuch as it has multiplied and magnified her capacity to strike. Into the political questions arising out of this altered situation I, of course, refrain from entering.

Finally, I turn to the commercial effects of the new railway, which have been most foolishly under-estimated, and which I am disposed to think will in the end turn out to be the most important of all. Here let me call attention to the steps which Russia has taken to encourage commercial development, and, as a corollary, to the indisputable fact that she is the sworn and open enemy of British trade. In the first place, the railway was constructed so as to correspond with the principal existing caravan and trading routes, whose merchandise it was intended to attract. Next, an annual fair has been established at Baku, in connection with the Transcaspian line, for the sale and exchange of the commodities of the East. So far this undertaking has not been a very great success, and much business has not been done. The fair, however, is still in its infancy, and may have a considerable future. The telegraph wire, which has been extended even to native cities like Bokhara, permits an immediate correspondence between the markets of East and West. In the Russian territories I heard that Russian merchants are exempted from dues, while native merchants are taxed, and European, i. e. English, products are rigidly excluded. In 1882 the import of foreign goods into the Transcaspian territories was absolutely interdicted; and a heavy import duty was placed upon colours, tissues, and teas from India. The consequence is that the import trade from India *viâ* Afghanistan to Bokhara—at any rate of English manufactures—has almost been killed. The figures of such goods imported *viâ* Herat show a steady annual reduction. They are being driven out of Afghan territory, and out of Herat itself. Bokhara is positively stocked with the products of Russian factories. I do not suppose that more than a few pounds' worth of British cottons or calicoes are now to be found in the entire bazaar, which they formerly crowded. It is the same in Northern Persia and Khorasan, which are now served by the Transcaspian line. General Komaroff boasts in his latest report that the sale of Russian goods is yearly increasing, and that of English goods diminishing, in the towns of Bujnurd, Kuchan, and Meshed. This is a part of the antagonistic and prohibitive policy which Russia has already pursued against British trade in West Persia.

By the annexation of Batoum, and the consequent closure of that overland route to Teheran, British trade, which has been driven to the far longer and more difficult route from Trebizond, has diminished to the extent of close upon 1,000,000*l.* a year. What Russia has already done

in the west, she is now doing in the east. The Transcaspiian railway gives her an absolute transit monopoly of the products of Central Asia, of its cotton, its raw and dyed silk, its silk and cotton tissues, its velvet, lambskins, carpets, leather, dried fruits, goat's hair, camel's hair, and furs ; in return for which the markets of the khanates are already, and those of North Afghanistan will in time, be flooded with Russian prints and calicoes, broadcloth, hides, iron tools and implements, cutlery, chinaware, and samovars.

Everywhere new markets are being opened to Russian and lost to English trade. I am astonished at the apathy which is displayed in this country upon the subject, and at the placid contentment with which English merchants have suffered themselves to be ousted from a region over which at one time they held almost unquestioned commercial sway. General Annenkoff's railway is said already, in spite of the desolate countries which it traverses, to be defraying its working expenses, and whispers of a surplus have actually been heard. It is even rumoured that it is to be the pivot of a vast mercantile combination which is to embrace half the East, and to put the crown upon the Central Asian ascendancy of Russian trade. However this may be, the commercial importance of the line is indisputable, and I am surprised that more attention has not been paid to it.

I have now described to you the Transcaspiian railway—the districts it traverses, and its present and future aspects.

In conclusion, I think I may add that no one here grudges Russia the advantages, political, military, or commercial, which she has gained or may gain by this striking enterprise, provided she uses them fairly, and in the interests of peace ; on the contrary, we may join in congratulating her and General Annenkoff upon the successful execution of what ought, in sagacious hands, to become a powerful instrument of civilisation, and an agent for the public good.

After the reading of the paper,

Sir RICHARD TEMPLE, M.P., said that his honourable friend, the lecturer, had stated that this was the first time he had delivered a public lecture. He (Sir Richard) was sure they would say he had made a splendid beginning. For many years this Hall had resounded with the applause given by expert audiences to celebrated lecturers, but he ventured to say that never in this Hall had a lecture been more effectively delivered or better illustrated. His honourable friend seemed to apprehend that some parts of his speech might be considered dull : on the contrary, he had clothed a most interesting subject with diction that was thoroughly suitable and graphic, and worthy of his reputation as one of the rising orators of the House of Commons. He (Sir Richard) must not touch upon the very great political significance of the account given by the lecturer this evening, but there were just two points to which, before a Geographical audience, he might be permitted very briefly to allude. Firstly, he would ask, Has this railway, which has been so well constructed, been furnished with a sufficient amount of rolling stock ? Secondly, If the bridge over the Oxus is of a temporary character, and a somewhat fragile wooden structure ; then supposing it were not available for transport, is there anything like

a sufficient flotilla on the Caspian? He need not dwell upon the importance of those two questions. Then there is this further point: he presumed that by hugging the base of the hills, the Russian engineers have secured a perennial and certain supply of water for the requirements of their line. But, further, presumably the streams that rise in those Persian mountains and flow towards the desert, will bring fertility in their train; and, therefore, by a skilful application of that hydraulic engineering of which our President is so great a master, they may succeed in bringing about a great deal of cultivation, habitation, and fertility all along the line; so that, by a combination of railway and canal engineering, it may become a belt of future population and cultivation. Lastly, it would be very instructive if we could ascertain whether there is any chance of the former agricultural prosperity of Merv being resuscitated. He presumed that when Merv was such a great centre of civilisation in former ages, there must have been some good geographical or topographical reason for that. Do, then, those natural resources which made Merv what she was, still exist as physical causes, and is it possible that those fructifying influences may once again be brought into beneficent operation under Russian sway? Recently, Mr. Curzon was kind enough to show me the proofs of a paper he proposed to print regarding the North-Western frontier of India, from the mouth of the Indus up to the Kyber Pass. That paper was extraordinarily accurate. He (Sir Richard) was necessarily acquainted with every inch of that ground, and therefore he naturally concluded that when he found his honourable friend so entirely correct regarding ground with which he was well acquainted, he concluded that his authority is to be accepted regarding these localities, which he, and probably all those present, had not had the privilege of seeing. Therefore he was sure that the lecture, picturesque as it was, must be reliable in its topographical and geographical information.

Mr. J. ANNAN BRYCE, having been in those regions lately, ventured to say that he thought the questions the lecturer had laid before the meeting to-night were of great importance; and when the paper was published, and the further paper to which Sir Richard Temple alluded, it would be worth our while to read them carefully. The latter part of the present paper was peculiarly interesting, and worthy of careful attention, judging by what he (Mr. Bryce) himself saw in the Caucasus this year. On the Trans-Caucasian Railway, from Batoum to Baku, the progress of trade and commerce has been so extraordinary that we can well believe the enormous effect which the opening of the railway on the other side of the Caspian from Uzunada to Samarkand and Tashkend is likely to produce. The Russians have shown extraordinary vigour, and he was sorry to say that the policy which they have pursued with such tenacity for the last few years, of high protective duties, is likely to continue to hamper the development of British trade in those regions. We could only hope that eventually the progress of events would be too much for the Russians themselves, and they would be forced, in their own interest, to alter their policy. He thought at present, however, there was very little hope. In the latter part of his paper, Mr. Curzon has shown how the Russian productions are now driving out English and Indian productions from the markets of Central Asia and Persia. The Russians have, by this extension of their system of railways, and their policy of protection, managed to force more and more all the numerous tribes of those regions into the consumption of their productions. Mr. Curzon points out that Russian goods are supplanting British and Indian goods in Afghanistan. Ten years ago, long before the Trans-Caspian railway was dreamt of, he (Mr. Bryce) was astonished to see Russian porcelain in the bazaar of Peshawur, and it will easily be seen how much more formidable the competition is likely now to become.

Hon. G. CURZON, M.P., in reply, said he possessed the figures relating to the rolling stock on the railway, but he had refrained from reading them to the meeting.

The exact figures, however, it was difficult to ascertain, because the line was not itself in a finished condition; and a good many engines and wagons which had been ordered had not yet arrived. Speaking roughly, there were at present between 70 and 100 engines, and probably 1500 wagons. With regard to the supply of water from the Persian mountains, Sir Richard Temple inferred that the line of railway might in time become the centre of a prosperous and fertile country. He was afraid that could not be realised, for the simple reason that the streams were insufficient in number, and still more so in volume. As Mr. Lessar told him only a few weeks ago, every drop of available water was already utilised. With scientific appliances for storage, and more even diffusion, the Russians might extend the fertility, but not to such an extent as Sir Richard Temple had inferred. No doubt in days gone by Merv was a region of great fertility, and the possibilities of improvement there were greater than elsewhere. The whole district had been made over to the private purse of the Czar, and the result was that scientific engineers had been sent out; the great dam across the upper waters of the Murghab was being repaired; millions of young trees were being planted; cotton cultivation was being encouraged; and there was reason to hope that in days to come the Merv Oasis might be as prosperous as in days of yore. With regard to the commercial effect of the railway, what Mr. Bryce had said was perfectly correct, and very serious indeed. There could be no doubt that Russia was, and had every right to be, our rival in Asia; and that with her protective tariffs she was gradually ousting English commerce. It would be for Englishmen to counteract that in some way.

The River Antanambalana, Madagascar.

By L. H. RANSOME.

Map, p. 324.

THE north-east of Madagascar is at present less known than almost any other part of the island. Indeed, with the exception of M. Grandidier (the well-known French traveller), no one has as yet done any exploring in that direction. Having been sent out last April by an English Company, to make a map of the river Antanambalana and report on some forest land situated at the north of Antongil Bay, lat. 15° S., long. 50° E., I had an opportunity of seeing something of this part of the country, which is certain in the near future to become much better known.

The district I had to visit consists of 1600 square miles, commencing on the coast-line at the extreme north of Antongil Bay and extending inland in a north-westerly direction.

With the exception of a mile or so of flat wooded land stretching along the coast, nearly the whole of this area consists of a succession of mountains, which rise to a height of about 2000 feet, and which are for the most part densely covered with virgin forest. The river Antanambalana flows down from the mountains in a south-easterly direction into Antongil Bay at about its most northerly point, and close to its mouth

is the village of Maroantsetra, a place of some importance, having been twice bombarded by the French during the late war.

Unlike most of the rivers on this coast, the mouth of the Antanambalana is not closed by a bar, but ends in a small natural bay formed by a strip of land known as Bullock's Point, which bay affords excellent anchorage for good-sized vessels. The river varies considerably in width, being in many places quite 300 yards wide, while in others it is not more than 30 yards across; it is full of small islands and sand-banks, the latter being covered with water in the rainy season, while in the dry season they are left exposed and the river confines itself to a narrow channel. The depth of this channel varies constantly; sometimes when the water is very low it is in places not more than three or four feet deep, while in some of the reaches it is 15 or 20 feet in depth, even at low water. As it is not unusual for the river to rise or fall four or five feet in the course of a month, the current is very variable, and when full it is a matter of some difficulty to travel against it.

For the first 20 miles up from the mouth, along the river-side are numerous small villages, generally with rice-fields adjoining; but, except where clearings have been made by the natives, the forest grows right down to the water's edge, the trees overhanging the river. About 22 miles up, rapids commence, which become stronger and more frequent as one ascends, and at a distance of about 30 miles from the mouth the river becomes unnavigable for large canoes, on account of some cascades, and although these were passed in a small canoe with considerable difficulty, the rapids beyond were found too strong and frequent to make it worth while to ascend further. At this point all traces of habitation had long since disappeared, and in the forest at the water's edge the undergrowth was so thick as to necessitate cutting one's way at every step.

The river, as far as was surveyed, is remarkable for having very few tributaries of any size. In fact, except for the Vohimar, which flows into it at Ambinanitelo, about 20 miles from the mouth, there are no important tributaries, though the main stream is fed by several small torrents which flow down from the mountains in the rainy season; but which in the summer are entirely dried up, and form useful paths by which to penetrate the dense forest. Though the Vohimar is a stream of some size, it is only navigable as far as is shown on the map, as here, too, cascades occur which make it impossible to ascend in canoes. Indeed, it may be mentioned that this drawback is found to exist in most of the rivers on the north-east coast.

The scenery throughout is very fine, the soil and climate being peculiarly adapted to the growth of vegetation. The forests in this district are rich in timber, among which are to be found in large quantities both rosewood and ebony, while several other hard woods, as yet unknown to commerce, are abundant. Of these woods a large number

are used by the natives for building huts and making canoes, and it is only by this means that one can at present judge of their durability. Unfortunately, as our visit to the forest was made in the winter months, the specimens we collected were necessarily imperfect, it being impossible to procure either the blossoms or fruit from many of the trees, so that, out of forty-two specimens, only four could be identified at Kcw. Of eighteen others, the genus was, with more or less certainty, ascertained; and of a few of the remainder the natural order.

Of the four which were identified, the native names are:—Nanto or Natte (*Chrysophyllum inophyllum*); Azovola (*Derris uliginosa*); Intzy (*Azelia bijuga*); Paka (*Homalium nobile*). All these woods are abundant, especially Natte and Intzy. Natte is extensively used by the natives both for building and canoes; it is very hard, and in colour rather brighter than mahogany. The bark yields a bright red dye, and contains a large amount of tannin.

Azovola, a kind of rosewood, is finely figured, and should be useful for cabinet work. It is used chiefly for building purposes. Intzy is more used by the natives in this district for building their huts than any other timber, as no amount of exposure to the weather seems to affect it. It is a tough, hard wood, of brown colour, which turns very dark with age. Like Natte, the bark yields a red dye which is very fast, and the wood also stains when first cut. The tree is large, and grows to a considerable height before branching. Paka, which is found in no other country, is a hard wood of bright red colour, but, as a timber, is inferior to the above-mentioned. With regard to the other trees (several of which are likely to be valuable for their timber), four were of the genus *Ficus*, four belonged to *Cynometra*, and three were *Anonaceæ*. Two were myrtles (*Eugenia*); and one was a species of *Cussonia*, belonging to the same natural order as our English ivy.

Besides the timber, the forests are rich in orchids, mostly epiphytes, the most remarkable belonging to the genus *Angræcum*, a feature of which is that the flower is remarkable for having a very long spur. The indiarubber vine (*Landolphia madagascariensis*) is also abundant throughout, though the natives, in collecting for the traders, have destroyed immense quantities of the larger creepers by pulling them up by the roots.

Of the fruits found here, the most common are pineapples, coco-nuts, guavas, bananas, mangoes, oranges, and lemons, which are noticeable for their very long thorns, and a fruit resembling a raspberry in appearance and taste, probably *Rubus rosifolius*. Though many of these are not, of course, indigenous, they are found in the forest far from any villages, and thrive without any care whatever.

Of the vegetables, the most common are rice, manioc, ginger, chillies (*Capicum frutescens*), and a kind of bean (*Dolichos lablab*) much resembling a lentil in appearance and taste. Many of the traders on the coast

grow European fruits and vegetables, which do well with a little care; among these may be mentioned tomatoes, potatoes, cabbages, onions, peas, and beans. The soil in which these vegetables are grown is sandy, and contains in some places a quantity of iron; but further inland clay is found mixed with the sand, and in the denser forest the soil is almost entirely of a dark red clay.

The largest wild animals found in these forests are the pigs, and these are very numerous, especially in the neighbourhood of the rice-fields. They much resemble the African wild boar, being inclined to a brownish-red colour, and having long pencilled ears. Besides these are several varieties of lemur, of which the most common are the grey, the black-headed (*Lemur brunneus*), the ruffed (*Lemur varius*), and the white-fronted (*Lemur albifrons*). A fine lemur, with black head and feet, white breast, and red back, was brought down from the north by a native; but having eaten some beef one day, it unfortunately died before he could be brought home.

The babacoote, a species of large lemur without a tail, is also found here, as well as the aye-aye (*Cheiromys madagascariensis*) a nocturnal beast peculiar to the country, and several smaller animals, including large numbers of flying foxes.

Among the birds are several species of the pigeon, mostly of a bright green or a deep blue colour, and in the denser forest two varieties of the black parrot (*Coracopsis nigra* and *C. obscura*) are common. Occasionally also large quantities of guinea-fowl (*Numida tiarata*) were seen, though they were very wild and difficult of approach. A bird called by the natives "kirombo" (*Septosoma discolor*) frequents the high trees in the thicker parts of the forest. They are generally seen in pairs. The male and female are very different in appearance; the former having a grey head and breast, and dark green wings and tail, the feathers of which are tipped with dark red, while the female has a yellowish-brown head and breast covered with dark brown spots, the back and wings being of a greenish-blue. If one of these is shot, the other does not fly away, but perches or flies round close at hand calling for its mate.

Of the smaller birds the most noticeable are large flocks of parroquets (*Psittacula madagascariensis*), which keep to the more open tracts; the honey-bird (*Nectarinia souimanga*); the weaver (*Ploceus madagascariensis*), of bright red colour; two kinds of dark blue waterfowl with red beak and legs (*Porphyrio smaragnotus* and *P. alleni*); two kinds of cuckoo, one a very handsome blue bird with a long tail (*Coua caerulea*); the other a brown bird with long dark brown tail (*Centropus madagascariensis*). The banks of the river are alive with kingfishers (*Corythornis cristatus*), which much resemble the English bird, and there is also a rarer species of red kingfisher (*Ipsidina madagascariensis*) to be found as well. A bird almost as common as the kingfisher is the bee-eater

(*Merops madagascariensis*), of a bright green colour. Herons and bitterns are also numerous, and the marshy places are the abode of thousands of teal and wild duck of various kinds.

The river itself contains innumerable crocodiles; indeed, in some of the villages we were informed that the deaths from these reptiles were as much as two per cent. a year. The snakes I obtained are now in Dr. Günther's hands at the Natural History Museum, and I am informed by him include some interesting species. A scorpion I brought home is stated by the same authority to be a new species (*Buthus piceus*); he has also named for me among the centipedes I brought home, *Scolopendra subspinipes* and *Sphserotherium actæon*.

The fish, which are abundant, are caught by the natives making wicker enclosures in the shallow water along the banks; these enclosures have a small opening at which the fish enter at high tide; but which, when the water recedes, is closed so that they cannot escape, and are taken out as required. As the river throughout its course is shut in by mountains, the climate is decidedly unhealthy, malaria being prevalent throughout the year. During the wet season the rainfall is almost incessant for a week at a time, and in the neighbourhood of the river the hill-sides are enveloped in a white mist for three or four hours after daybreak, in spite of the fact that a bright sun is often shining. In the dry season, too, the mountains are visited by very heavy and frequent thundershowers, which swell the river and cause floods, making the neighbourhood most unhealthy after they have subsided. Besides this, the temperature is most variable, the thermometer often registering a difference of 40° between 6 a.m. and 10 a.m. Indeed, on several occasions during our stay it stood at 58° in the early morning, but by 10 o'clock had risen to 102°.

It will be remembered that nearly the whole of Madagascar is subject to the Hova tribe, who inhabit the centre of the island, and whose chief town, Antananarivo, is the seat of government. They are nominally ruled by a queen; but it is the prime minister (her husband) who really holds the reins of power.

This district is, of course, under the Hova rule, administered by a Hova governor chosen by the prime minister, and who remains in office during his pleasure. This governor is answerable to none but the prime minister for his actions; and being at least ten days' journey from the capital, is practically all powerful in the neighbourhood; he resides in a village called Soanierano, situated about four miles west of Maroantsetra.

When the governor wishes to issue a proclamation it is done as follows:—Messengers are sent out to all the villages under his control, bidding the principal men from each to assemble at an appointed time; this gathering is called a "kabary." When all those summoned are present, the governor or his deputy reads aloud the proclamation, which

then becomes law; the representatives of each village being responsible for its publicity. It is not unusual to administer justice at a kabary of this kind; the governor, after hearing the evidence on both sides, pronouncing sentence. A law, which is universal throughout the island, and is the cause of much discontent among the various tribes, is that of forced labour. Under this law any native may be taken by Government and put to work of any kind for an indefinite length of time without receiving pay or even food; should he refuse, he is liable to be speared to death.

Having received instructions from the capital, the governor of Marantsetra welcomed us cordially; and when we started for the forest, sent with us officers, who, we were told, would accompany us all the time during our survey, to explain to the natives the reason for which we had come, and to ensure our not being hindered in our work. These officers (who were working for Government under forced labour), were relieved every week or ten days by others; and on returning to the governor's village reported to him exactly what we were doing, the real reason of their presence being, as we subsequently found out, to see that we did not search for gold or other minerals. During our journey we found the natives in most cases very hospitable and friendly; on our arrival at a village the chief would generally give up his house for our use as long as we chose to stay, at the same time presenting us with live poultry and rice. In some few instances the natives showed themselves suspicious; but the presence of the officers always ensured our being treated with civility.

The tribe which mainly inhabits this portion of Madagascar is that known as the Betsimisaraka. They are a more hardy and energetic race than the Hovas; and though smaller (their average height being 5 feet 5 inches), are wiry and well made. The women, who are notable for their fine carriage, are taller in proportion than the men, and do their full share of work, spending a good deal of their time fishing in canoes. The colour of this tribe is a good many shades darker than that of the Hovas, and the hair generally woolly, though occasionally it is found straight. Their features are of the regular negro type, showing no traces of the Malay blood which are so frequently seen in the ruling tribe. They are of a naturally peaceful disposition, and though not wanting in physical courage, are full of superstitions of all kinds. They are a light-hearted, lazy race; but if well treated, prove efficient workmen, and are decidedly more cleanly than any of the other tribes with which we came in contact.

Besides the Betsimisaraka are also found the Bara tribe, numbers of whom come up from the south in order to procure work, generally staying for six months or a year at a time. One of the characteristics of this tribe is that they arrange their hair in numerous small plaits around the head, anointing it plentifully with beef-fat. In physique

they much resemble the Betsimisaraka, though they are by no means so intelligent. A tribe somewhat resembling this is the Tsimahaiti, who also are found in these parts, and are a tall athletic race, but by no means cleanly either in their appearance or habits.

A few of the Sakalava (a warlike tribe from the west coast) also find their way here. They are physically the finest race on the island, and have always resisted more or less the Hova Government. It was this tribe, it will be remembered, who assisted the French against the Hovas during the recent war.

In engaging workmen the cost of labour is not a serious item, as unskilled men can be procured for from \$2½ to \$3 per month, while a skilled carpenter can be obtained for from \$4 to \$6. This does not include keep, which does not, however, amount to much, as, living entirely on rice, a man can be well fed for \$½ a month.

Besides these tribes, it is interesting to note that one hears occasionally of wild men being seen in the dense forest. We were informed by a trader from Mauritius, a Mr. Carmes, who saw him, that in 1879 a wild man was captured about 80 miles west of Maroantsetra. He was caught by some Malagasy in the employ of a Manahar trader, while asleep on the branch of a tree, and when taken resisted violently, biting his captors severely; after a few days' confinement, however, he ceased to be aggressive. Mr. Carmes describes him as being a powerfully built man of about five feet nine inches in height, his face and body being thickly covered with long black hair; his mode of walking was peculiar, as he travelled very fast, with his head down, occasionally going on all-fours, his eyes (which resembled in expression those of an animal rather than of a human being) invariably being fixed on the ground. When caught he was perfectly nude, but wore clothes when provided with them. He could never be induced to eat flesh or any kind of cooked food, subsisting entirely on manioc and other roots; nor would he sleep in a recumbent position, but when resting preferred to squat on hands and feet on a stool in a corner of the house. After some weeks he commenced to learn a few words, and by means of these and signs it was understood that he had a father and two brothers in the forest where he was taken. These were found and surrounded by a search party one night, but, being disturbed, easily eluded their pursuers, jumping from tree to tree like monkeys and running on all fours. The captured man died five months after being taken.

The tribes, though having constant intercourse with one another, maintain to a great extent the customs peculiar to each; the Betsimisaraka, for instance, having quite a different mode of burying their dead to that of the Hovas. While the latter have their tombs made of rock, in which they deposit the corpses wrapped up in several lambas, the Betsimisaraka employ quite a different method. Having chosen a spot for the cemetery in the forest, as near a river as convenient, a clearance

is made. To this clearance the corpses, having first been placed in rough wooden boxes, are conveyed and deposited on the ground. It is the custom after the ceremony to place at the head of these rude coffins a bottle of rum to propitiate the spirits. That this attention is appreciated is evident from the fact that the bottle is invariably found empty on the following day. Every four or five years it is customary to place the remains in a new box, which is the occasion of a feast, a bullock being killed and the ceremony performed amid general rejoicing.

It should here be mentioned that the respect in which deceased relatives are held by this tribe (as, indeed, is the case with all the tribes) is most marked, and the greatest insult possible to a native is to swear against his ancestors, although he will bear with perfect equanimity any amount of strong language directed against himself.

The custom of "fato-dra," or brotherhood by blood, as described by the Rev. James Sibree in his book, 'The Great African Island,' is prevalent. It is carried out in this district as follows:—When two men, from friendship or interested motives, decide to become brothers by blood, a day is appointed, their relatives called together, and an incision having been made in the breast of each, two pieces of ginger are brought and one piece dipped in the blood of each man. Each one then swallows the ginger which has been immersed in the blood of the other, at the same time repeating solemn vows to assist the other to his utmost in all his undertakings, and in any need whatever, should occasion arise. The vows thus made are regarded as sacred.

Another custom, or rather superstition, which is apt to prove inconvenient to travellers, is that among certain tribes certain days are considered unlucky. On these days no one transacts business; and should the traveller arriving at a village wish to procure food, no one will sell him anything; nor can the inhabitants be persuaded to part with an article for even double its value. When a native has a relation who is dangerously ill it is also considered unlucky for him to buy or sell.

There is a great resemblance in the dress of all the tribes; the lower classes wear a grass mat hung over their shoulders, and gird their loins with a piece of cloth; except for this they are nude. Those who can afford it, in place of a mat, wear a lamba, a garment made of cotton or some other light material, which is loosely and picturesquely draped round the figure; these are most commonly of white; but they are also frequently worn in bright colours, or with an ornamental border, and are cast aside when any work requiring exertion has to be done. The dress of the women is much the same as that of the men, though the lamba is generally draped more closely round the figure, and sometimes fastened with a girdle. The men frequently wear little round caps made of grass of the brightest colours; both sexes carry charms on the breast suspended from a necklace, in which they have the greatest faith.

Every native carries a snuff-box made either of a piece of bamboo or horn; but instead of taking the tobacco through the nostrils, it is always placed in the mouth under the tongue.

The dress of the Hova officials is varied and characteristic; the poorer officers generally wear a lamba and tweed trousers, and invariably carry an umbrella, while the more exalted prefer a uniform, which uniform is not apparently regulated by the rank of the officer, but depends on his taste and the length of his purse; as an instance of this it may be mentioned that the governor of Maroantsetra has lately ordered from England an English general's full-dress uniform, and an admiral's cocked hat, to wear on state occasions.

The mode of dressing the hair has been touched on before; but it may be mentioned that the women will spend hours at a time over this part of their toilet; which, indeed, the men too do not neglect, attaching considerably more importance to it than to the more necessary duty of washing. The only weapon carried by the natives is a spear from five to seven feet in length, with an iron head and tail-piece, which latter is made flat for the purpose of digging up roots. They are very expert in throwing these weapons, and also use them for spearing fish.

The favourite musical instrument is the accordion, which is imported in large numbers, and always finds a ready sale; their skill, however, on this instrument is limited, as they seldom master more than three or four chords, which they will play over and over again for hours at a time. Of the native instruments the principal are a kind of banjo made of gourds, with a wooden shank, having two strings made of fibre; and a somewhat more elaborate instrument made out of a bamboo by splitting the strings out of the surface of the bamboo itself, and stretching them by inserting small cork bridges. These are most difficult to play, but are most pleasant to listen to on the rare occasions when one hears a good performer.

The type of house found all along the north-east coast is much the same. They are built on poles, the floor being raised from four to eight feet from the ground on account of malaria. Except in rare instances the dwelling consists of one room only, which is seldom more than 10 feet square. The house is entered by ascending an inclined pole notched on the upper surface so as to provide a foothold. There are generally two doors on opposite sides of the house and facing one another, which are opened by sliding back. There are no windows or chimneys; but a hearth made of clay is built in one corner, and over this is hung a rack of bamboos, on which the fuel and other articles are placed to dry. In another corner are piled bags of rice for family consumption and the large bamboos which are used by the women as vessels for fetching water. The floor is covered with grass mats, and when a stranger arrives a clean mat is always provided. The roof is thatched with the leaves of the well-known traveller's palm, the walls being made of dried

rushes. Sometimes as many as ten people live together in one of these huts.

As the country is very hilly and the forest dense, there are but few pathways, and of course no roads whatever. The chief mode of progression, therefore, is naturally by means of the different rivers, along the banks of which most of the villages are situated. As the natives spend a large portion of their time upon the water, they become very expert in handling a canoe; and it is common to see a child of five or six years seated in a small canoe and guiding it with considerable skill in a strong current. As before mentioned, the rivers contain several rapids, in shooting which good judgment and nerve are required, as a false step would often be fatal.

The canoes are of all sizes, from the small single canoe, not more than five or six feet in length, and just wide enough to sit in, to the large canoes on the coast, which are occasionally used on the sea, as long as 35 feet, and sometimes 5 feet in width. Whether large or small, the shape is always the same; both prow and stern being pointed and slightly raised. They are made from the solid trunk of a tree, being hollowed out by burning fires on the surface and scooping out the charred wood until a sufficient depth is reached, the outside of the canoe being shaped with an adze. They are propelled by means of a short paddle with a wide blade, having a crescent-shaped handle on the top.

As at present the only method of sending goods from this district to Tamatave is by means of small sailing vessels, there is not yet much done in the way of trade here. There are, however, a few traders at Maroantsetra who send cargoes of the principal products to Tamatave for export. Of these, the most important are indiarubber, rice, hides, beeswax, and mats.

The method of preparing indiarubber for the market, as before alluded to, is most wasteful; for, besides entirely destroying the plant, by no means the full amount of juice is extracted. The process of preparation for export is this:—The creeper is first chopped up into short lengths and crushed, the juice being collected in a wooden vessel, after which it is mixed with a weak solution of sulphuric acid and water, and worked by the hands into balls, which are pricked all over to allow the water to escape. Several creepers in the forest yield a juice similar to the genuine rubber, but entirely worthless; as these are very abundant, the natives, to save themselves trouble, frequently mix them with the rubber juice before offering it for sale, and it requires a careful examination to detect the fraud.

Besides the collecting of rubber, the making of Malagasy mats is almost the only other industry here. These are manufactured in nearly every village, however small, by the women, being woven by hand, and the different colours obtained by the use of dyes extracted from trees and plants.

The wealth of timber in these forests has lately induced several people to apply to the Government for concessions, and should it prove as valuable as is expected, a new and important industry will be developed which will rapidly open up the country. As the soil is so prolific, it is to be hoped that in the course of a few years, when these large tracts of forest land are cleared of their timber, plantations of tobacco, vanilla, coffee, and other such products, will spring up in its place.

GEOGRAPHICAL NOTES.

The Royal Medals and other Awards.—As stated in the Report of Evening Meetings in the present number, the **FOUNDER'S MEDAL** for the present year has been awarded to **Mr. A. D. CAREY**, of the Indian Civil Service, for his remarkable journey, undertaken at his own cost in 1886-7, through Central Asia; and the **PATRON'S MEDAL** to **Dr. G. RADDE**, of Tiflis, for a life devoted to the promotion of scientific geography and original exploration and research. The **MURCHISON GRANT** has been given to **Mr. F. S. ARNOT**, towards providing and conveying a suitable present to the chief Chitambo, of Ilala, as recompense for his services in connection with the removal of the body and personal property of Dr. Livingstone in 1873; the **BACK PREMIUM** to **Mr. F. C. SELOUS**, in acknowledgment of the value of the geographical work accomplished by him in his recent journeys in Mashuna Land and north of the Zambesi; the **CUTHBERT PEEK GRANT** to **Mr. F. S. ARNOT**, in recognition of the interest and value of his seven years' travels in Central Africa; and the **GILL MEMORIAL** to **Mr. OGLE**, of the Indian Survey Department, for his excellent survey work in Eastern Assam and neighbouring countries.—The three new Honorary Corresponding Fellows elected are;—**Don Manuel V. Ballivian**, of La Paz, Bolivia; **M. Charles Maunoir**, General Secretary of the Geographical Society of Paris; and **Mr. E. C. Dutton**, of Washington, U.S.

The Snow on Kilimanjaro.—**Dr. H. Meyer**, in a paper read before the Geographical Society of Leipzig, deals ably with the snow-fall on the summit of this mountain. Having shown that the southern and south-eastern slopes of the mountain are exposed during summer to the south-eastern trade winds, whilst the summit rises into the region of the anti-trades, and that local winds, sometimes of considerable force, ascend the mountain slope during the day, and descend during the night, he explains how these winds produce rain and snow. We appear to have misunderstood Dr. Meyer when we stated that he described the Kibo as a "crater-summit." He looks upon the wall of ice which stopped his further progress as the edge of a cap of névé which covers the summit, and which, owing to the combined influence of the wind and radiation has melted away on its northern side. On the south, however,

it appears to form a veritable glacier, which issues from the ancient crater-trough (Kratermulde) of the Kibo.

The Trade of the Congo.—From the official returns of the trade of the Congo Free State during 1888, we learn that the total value of the special exports (i.e. exports of the produce of the State) amounted to 2,609,300 francs; while the value of the general exports (i.e. of the total trade that left the river) was 7,392,348 francs. The principal article of export continues to be ivory, of which 54,812 kilogrammes, valued at 1,096,240 francs, represent the produce of the State; and 101,746 kilogrammes, valued at 2,034,920 francs, represent the entire yield of ivory which left the river. Next in importance come palm-nuts, of which 3,773,957 kilogrammes, valued at 754,791 francs, were produced in the territories belonging to the State, and nearly 6,000,000 kilogrammes, valued at 1,194,608 francs, the produce of the entire region. The quantity of palm-oil exported by the State was 1,033,612 kilogrammes, of 465,125 francs in value, while somewhat more than half that quantity was exported by territories outside the State. Caoutchouc comes next; the total quantity exported from all quarters was 593,752 kilogrammes, valued at over 2,000,000 francs, of which only about one-eighth was the produce of the Free State. Of coffee, 575,624 kilogrammes, valued at 863,430 francs, left the river, but none of this apparently can be credited to the Free State. Considerable quantities of fibres, wax, and skins were also sent out by the river, but these all seem to have been obtained from districts outside the State limits. Small quantities of copal, sesame, copper, orchilla, and annatto, were also exported.

The Soil and Climate of German East Africa.—An interesting paper, dealing in a comprehensive way with the composition of the soil and the climatic conditions of the German part of East Equatorial Africa, is contributed by Dr. K. W. Schmidt to the current number of *Petermann's 'Mitteilungen.'* The object of the author, who has himself traversed the greater part of the region in question, is to remove any misapprehensions that may exist concerning the nature of the country and its prospective economic value, and to show what districts may be accurately described as "fertile." After discussing the various physical conditions upon which the fertility of a country depends, he proceeds to examine with reference to these conditions each district of this part of Africa, commencing from the Kilimanjaro-Wanga boundary on the north. The following are briefly his conclusions. The wooded and mountainous region of Usambara and the western part of Bondei, in consequence of the favourable character of the soil, which contains a large proportion of phosphoric acid and is composed of sand, clay, and humus, and by reason of the copious rainfall and extensive irrigation, may be truly described as fertile, and in the opinion of the author these countries have a great

future before them. The station of Korogwe in the valley of the Pangani, and that of East Planta in the eastern part of Bondei, lie outside the area referred to, and the conditions which obtain in both these places are less favourable. West of Usambara extend vast steppes, utterly unfit for cultivation, in which the mountain districts of Paró, Usanga, &c., appear like isolated oases. The mountain mass of Kilimanjaro, composed of recent volcanic, basaltic, and trachytic rocks, and clothed with a wealth of forests, should become of great importance; the disintegration of the basaltic rocks supplies soil of great fertility. Both here and in Usambara cattle-rearing is an important industry. The physical conditions of the country between the Pangani and the Wami are apparently not very favourable; with the exception of certain spots in the actual valley of the Wami, and possibly in the neighbourhood of the station of Mbuzini, the soil is not good and the streams are insufficient. Westwards, the country of the Nguru, in its geological formation, its magnificent forests, its numerous small rivers, and its meteorological conditions, resembles Usambara. Southern Useguha, as far as the Kingani and Gerengere, including the districts of Udoe and Ukwere, is nothing but a vast waterless steppe, covered with tall, coarse grasses, with clumps of bushes and trees here and there; only in the most favourably situated spots are a few miserable villages to be seen, and mtama, maize, and mandioca are cultivated. Ukami, in its western part, abounds in lofty forest-clad mountains and rushing streams, and its soil is well adapted for cultivation; the soil of the eastern part of Ukami is, on the other hand, composed almost exclusively of quartz pebbles and gravel. Immediately to the west of Ukami stretches the vast desolate Mkata steppe, beyond which rises the mountainous country of Usagara, divided in the middle by the Mukondokwa river. With the entrance of the latter river into the plain of Farhani, a luxuriant, fertile, and well-populated valley opens out, which is a trade centre and the halting-place for the great caravans trading with the interior. The mountainous district of Usagara itself suffers from a lack of rivulets to water the larger and fertile valleys, and also from the sparsely wooded character of its mountain slopes, at least in the eastern part; the top soil is consequently not deep enough, and in many places the bare rock is seen. The soil of the well-known parts of Usagara is not suited for cultivation on a large scale. The author gives no information as to the station of Mwapwa, lying further to the west. The country of Khutu in its various river-valleys might furnish soil suitable for extensive cultivation. With regard to the three stations situated in the valley of the Kingani, viz. Usungula, Madimula, and Dunda, the first-named occupies a relatively healthy position on the edge of the steppe zone forming the southern part of Ukami, and the soil in its neighbourhood is exceptionally favourable for cultivation; it lacks, however, sufficient moisture, the rainfall being limited, and there being no extensive forests or streams in

its vicinity. The other two stations, situated on the marshy flats of the river, are very unhealthy. The soil is comparatively poor, and only suitable for rice; on the plateau which borders the lowlands of the river, perhaps cotton and tobacco might be grown. South of the Kingani Dr. Schmidt explored only the most northern part of Usaramo; the country is "park-like" in character, and not suitable for cultivation. The general result of Dr. Schmidt's observations is to show that there is a great difference in the fertility and consequent value of the various countries comprised within the German Protectorate in East Equatorial Africa, and that while there is a considerable extent of extremely fertile territory, the greater part does not appear to be capable of remunerative cultivation.

The German Protectorate in South-west Africa.—We extract the following notes upon this region from a short paper by Baron v. Steinäcker, which is published in the current number of *Petermann's 'Mitteilungen.'* The climate is healthy, and it is possible for Europeans to do hard work. The middle part of the country contains but few districts suitable for agriculture, but the more northerly and north-easterly regions present an extensive field for the activity of the agriculturist. The Ovambo tribes pursue agriculture to a very considerable extent. The middle country and the sandy district of Omaheke are well adapted for cattle-rearing. In Herero Land and Eisib as far as Ansis, the breeding of cattle, and in certain places, of horses, is remunerative. Sheep-rearing can be carried on in Omaheke. All the rivers marked on the maps contain water in the rainy season only, and then only in certain parts of their courses; in the dry season the water is found under ground. The irrigation difficulty may, in the writer's opinion, be got over by dams and artesian wells. The whole of the north and north-east, as well as the tract of country north of Lake Ngami, is rich in water. The southern parts of the Kubango and Chobe districts are, in the rainy season, impassable swamps. The country, as a whole, produces but little at present beyond hides. There are practically no means of communication in the country. The chief harbour for entering the country is situated in the English colony in Walfish Bay, and there does not seem to be any other point along the coast suitable for the formation of a harbour. The whole coast is destitute of water, and there are long stretches without any vegetation. The political conditions are, at the present moment, unfavourable. The Hereros and Hottentots are at constant strife, and although the European is safe as regards his person, so long as he does not interfere with the trade of the natives, his property, viz. cattle, is by no means held sacred. There is urgent need for some measures on the part of the German Government for guaranteeing security to the colonists. An excellent map of the whole region accompanies von Steinäcker's paper, embodying his own surveys and those most recently effected by other travellers. A careful examination of this map shows

that our present maps of the country require considerable modifications.

Projected Expeditions by Russian Travellers.—The following expeditions are announced as about to be undertaken in the course of the present year by Russian travellers:—(1) M. Grum-Grjimalo, well known to geographers for his explorations in the Pamir, proposes to explore Dzungaria, the Eastern Thian-Shan, Tsaidam, north-eastern Tibet, and the southern part of Chinese Turkistan, in order to complete the botanical and geological work of Prejevalsky's journeys and other travellers in this part of Central Asia. (2) In European Russia there will be an expedition under M. Faoussek to the shores of the White Sea, the principal object of which will be to determine the extent of the gradual rise of the land which takes place in the peninsula of Lapland. (3) MM. de Kuznetsov and Andrussov are contemplating an exploration in the north-east of the Caucasus, in the interests of botany and geography. (4) A scientific expedition, under whose leadership we are not informed, is to be directed to the extreme north-east corner of European Russia, beyond the Petchora. Important results to geography may be expected from these explorations.

Oklahoma.—As there exists much uncertainty as to the precise situation and extent of this United States region, about which there has been so much in the daily papers within the past few days, some information may be acceptable. Oklahoma lies in the heart of the Indian Territory, i. e. the region set apart for the exclusive occupation of the American Indians. This territory, it may be well to remember, is bounded south and west by Texas, north by Kansas, and east by Arkansas. Its area is 64,223 square miles, and its population 83,000 Indians, among whom live 30,000 whites by permission, and 6000 whites without permission. There are also a considerable number of negroes, who were formerly slaves to the Indians. Oklahoma, in the heart of the territory, has an area of 3120 square miles. By various treaties and orders, extending back to the Civil War, it has been withdrawn from Indian occupation, and converted into public land. It has been completely surveyed, though in the last survey map, 1885, of 12 miles to an inch, the name does not occur, nor are the boundaries precisely laid down. These boundaries are as follows:—On the east is the Creek Country, on the west the Cheyennes and Arapahoes; the "Cherokee Strip" on the north; and the Chickasaws on the south. Beginning at the north-west corner of the Creek Nation the boundary proceeds west 100 miles to the Cimarron river; thence southerly along that river to where a longitudinal line drawn 10 miles east of the 98th parallel crosses it; thence due south to the Canadian river; thence south-easterly along that river to the "Indian meridian"; north on that meridian to the Cimarron river,—down which the line goes to the western Creek

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boundary, and thence north to the point of departure. Many attempts have in past years been made by whites to force their way into Oklahoma, without permanent success. The territory appears in the Survey map to be abundantly watered by the Cimarron and Canadian rivers and their numerous tributaries (though after all water seems scarce in places), and is traversed north and south by a railway that communicates with the main lines.

REPORT OF THE EVENING MEETINGS, SESSION 1888-9.

Tenth Meeting, 8th April, 1889.

General R. STRACHEY, R.E., F.R.S., President, in the Chair.

ELECTIONS.—*William Matthew Blyth, Esq.; William Anthony Brignal, Esq.; George A. Chaddock, Esq.; Alexander Cook, Esq.; W. H. Payne, Esq.; Sir Owen Hy. Scourfield, Bart.; Rev. E. C. Spicer, M.A.; General Sir F. C. A. Stephenson, C.B.; Colonel W. Brooke Thomson (Bengal Staff Corps); Lieut. H. B. Vaughan, (Bengal Infantry).*

The PRESIDENT announced that the Royal Medals and other awards for the year 1889 had been that day made by the Council as follows:—

The FOUNDER'S MEDAL to Mr. A. D. CABEY (Indian Civil Service), for his remarkable journey in Central Asia, at his own risk and expense, during which he travelled over a distance of about 4750 miles, through regions which have never before been visited by an Englishman and very rarely by any European. The route he followed led from Leh, by Rudokh to Kiria and Khoten, thence across the desert to Kuchar, and south-eastward to the great inland sea Lob-nor, whence he traversed the Altyn Tagh and Kuen Iuen ranges, and travelling eastward struck the trade-route from Koko Nor to Lhasa, returning to Western Tibet by a new route through Hajjar, Sachu, and Hami. Also for the *résumé* of his travels and map contributed by him to the 'Proceedings' of the Society, by which he has rendered a most valuable service to geography.

The PATRON'S MEDAL to Dr. G. RADDE (Director of the Natural History Museum, Tiflis), for a life devoted to the promotion of Scientific Geography, as a traveller, observer, and author, and particularly for his five years' travels in Eastern Siberia (1855-60), his persistent exploration of the Caucasian chain (1864-5 and 1876-85), Mingrelia, Abkhasia, Karatchai, Daghestan, and of the Armenian Highlands, and the Caspian coast (1875-80), and his services as chief of the Trans-caspian Expedition in 1886. Also for the important works in which he has recorded the result of his explorations: (1) 'Reisen in Ost-Siberien, mit Karten,' 1862-4; (2) 'Die drei langen Hochthäler Imeritiens'; (3) 'Vier Vorträge über den Kaukasus,' 1874; (4) 'Aus den Hochalpen des Daghestan,' 1886; (5) 'Die Chewsuren und ihr Land,' 1878; (6) 'Reisen um die Persisch-Russischen Gränzen,' 1885; (7) 'Vorläufiger Bericht über die Expedition nach Manchurien und Khorasan,' 1887. And particularly for the talent with which, while paying special attention to various branches of natural history, especially ethnology, ornithology, and botany, he has kept in view their relations to geography, and has made it his main object to set out in a clear and comprehensive manner the physical characteristics of the countries he has explored, with their causes and effects (see Nos. 1, 3, and 5). And finally, for the zeal, energy, and artistic intelligence he has exhibited in the arrangement on a geographical basis of the Natural History Museum at Tiflis.

The MURCHISON GRANT to Mr. F. S. ARNOT, towards providing and conveying a suitable present to the chief Chitambo, of Ilala, as a recompense for his services in connection with the removal of the body and personal property of Dr. Livingstone, in 1873.

The BACK PREMIUM to Mr. F. C. SELOUS, in acknowledgment of the value of the Geographical work accomplished by him in his recent journeys in Mashuna Land and north of the Zambesi.

The CUTHBERT PEEK GRANT (one year) to Mr. F. S. ARNOT, in recognition of the interest and value of his seven years' travels in Central Africa.

The GILL MEMORIAL to Mr. M. J. OGLE (Indian Survey Department), in recognition of his excellent survey work in Eastern Assam, in Manipur, and in Northern and Western Burma, partly with Colonel Woodthorpe and partly independently.

The PRESIDENT also announced that the Honorary Corresponding Fellows elected at the same time were:—

Don Manuel V. Ballivian, of La Paz, Bolivia, the author of the "Library of Geography and History," containing much information regarding the geography of Bolivia.

M. Charles Mannoir, for many years General Secretary to the Geographical Society of Paris; and

Captain C. E. Dutton, of Washington, U.S., the author of the "Tertiary History the Grand Cañon District."

The papers read were:—

1. "Letter from Mr. Stanley, on his Journey from Yambuya to the Albert Nyanza." *Ante*, p. 263. The discussion was postponed to the next meeting.

1. "A Visit to the Glaciers of Alaska and Mount St. Elias." By Harold W. Topham. Will be published in the next number of the 'Proceedings.'

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—March 15th, 1889: M. Milne-Edwards in the Chair.—M. Mich. Venukoff wrote calling the attention of the Society to the two last volumes (Nos. 42 and 43) of the Memoirs of the topographical section of the Russian General Staff, and gave the following useful summary of the principal results which are of interest to geographers. (1) M. Ivanov, who was charged to execute topographical surveys in the northern portion of the Ural mountains, had determined the altitude of 150 points, and prepared a map of a considerable extent of country. (2) M. Scassy, the companion in travel of M. Potanin, had explored those parts of the Chinese Empire which border on the sources of the Yellow River, Lake Kuku-nor, the Khang-hai range of mountains, etc.; his explorations had been carried out with more detail and exactitude than those of the late General Prejevalsky. Besides making topographical surveys, he had fixed 19 points by astronomical observations. (3) M. Coulberg, Russian Commissioner for the delimitation of the Afghan frontier, had made magnetic observations at the following places, Zulfigar, Meruchak, Charchambe, Dowlat-abad, Andkhof, Bossaga, Palvart, and Chardjui. His colleague, Captain Guedeonov had determined the geographical position of 29 points. (4) M. Schwartz, during his journey in Eastern Bokhara, had settled the geographical position of 34 points, and further had made magnetic observations for 50 points. (5) M. Roudnev, the companion in travel of M. Mychenkov, had executed numerous topographical surveys in the eastern part of

Bokhara, over a large extent of country, and had determined 120 altitudes. (6) M. Schmidt, by his astronomical observations (22 points) in the territory of Akmolinak, had laid down the base for a triangulation of this part of the steppes of the Kirghizes. (7) M. Zakrevsky had determined the geographical position of 5 points in the valley of the Emil in Dzungaria. (8) M. Alexandrov, the companion of M. Ignatiev, had effected numerous topographical surveys in the region of the Thiau-Shan, and explored especially the glaciers found there. He had ascertained the height of the summit of Khan Tengri, which dominates this part; according to him it exceeded 23,950 feet. (9) MM. Polianovsky and Nazarov had commenced the triangulation of the southern part of the Trans-Ussurian province. A base, about 24 miles long, had been measured near the village of Poltavskoi, and the position of 25 points determined astronomically and trigonometrically. (10) M. Ernefeldt had fixed the geographical position of 18 points in Russian Lapland, from Torneå ($65^{\circ} 50' 42''$) as far as Utakosky ($69^{\circ} 51' 44''$). (11) Important researches had been made to ascertain with strict precision the longitudes of Moscow, Warsaw, Kief, Nikolaïev, Rostov-on-the-Don, etc., with the aid of the telegraph. (12) Volume 43 was almost entirely taken up with the report of M. Lebedev upon the geodetic works executed by him in Bulgaria (1877-9). He had determined the geographical and hypsometrical positions of 1274 points; thanks to his observations, it had become possible not only to construct an exact map of Bulgaria, Roumelia, and certain parts of Turkey, but to prepare two profiles of the Balkans, viewed from north and south. The Geographical Society of Russia had awarded to M. Lebedev its gold medal this year.—A communication was read from M. G. Rolland on the subject of artesian borings in the famous oasis of Ued-Rir. The author replied to certain observations made by M. Blanc at the previous meeting in his paper on the oases of Southern Tunis. Referring to M. Blanc's statements that fresh wells could only be sunk at the expense of existing ones, and that the supply of subterranean water was tending to diminish, M. Rolland stated that although the artesian basin of the Ued-Rir was not capable of affording an indefinitely increasing supply of water, still experience alone would indicate when the limit would be reached, and there was nothing to lead to the supposition that it was nearly being so. As a rule, French wells in the Ued-Rir, which were 30 years old, had not varied in their supply. New wells only injured the existing ones when they were sunk too close to the latter. From a careful study of the artesian wells of the Ued-Rir, it appeared that from 1000 to 3000 yards, according to the district, represented the radius of action of each well, and that a new well, if sunk beyond this distance from an existing well, had not an injurious effect upon it.—M. Durême forwarded to the Society an approximate survey of the Rio Grande and the Lower Jeba, accompanied by manuscript notes; and also a map of the lagoons of Great Bassam and Assinie.—The Comte de Bize-mont made a statement with reference to the preparations being made in connection with the forthcoming International Congress of Geographers, from which it appeared that many of the leading geographical societies of the world would be represented by delegates.—M. Vennukoff presented to the Society a map of the Pamir, on the scale 1:1,260,000. He explained that this map was not on sale; it accompanied a work on Zoology, entitled "*Mémoires sur les coléoptères*," by M. N. Romanoff, and a very few copies only had been printed for private circulation and distribution. From a geographical point of view this map was, said M. Vennukoff, interesting, as it showed, for the first time in all its details, the route taken by M. Grum Gijmanilo, one of the most indefatigable explorers of the Pamir.—In conclusion, M. Julien Thoulet read a paper upon the present condition of oceanographical studies in Norway and Scotland.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian B.G.S.*)

EUROPE.

Beaucherk. William Nelthorpe [LL.D.].—Rural Italy; an Account of the present Agricultural Condition of the Kingdom. London, Bentley & Son, 1888: 8vo., pp. [iv.] and 255. Price 9s. [Presented by the Publishers.]

Mr. Beaucherk, who was Secretary of Legation at Rome, has written a book of much interest in itself, and likely to be useful to those who take an interest in Applied Geography. The volume seems to be partly based on an elaborate inquiry by the Italian Government into the condition of the various provinces. The book tells more probably about the inside life of Italy than is to be found in any other work accessible to most Englishmen.

Dapontès. Constantin.—Ephémérides Daces ou Chronique de la guerre de quatre ans (1736-1739). Publiée, traduite et annotée par Émile Legrand. Tome troisième. [Vol. XX. of Publications de l'École des Langues Orientales Vivantes.] Paris, E. Leroux, 1888, large 8vo., pp. lxxxiv. and 176. Price 12 francs. [Presented by the French Minister of Public Instruction.]

Krones, [Dr.] Franz [von].—Die Deutsche Besiedlung der östlichen Alpenländer, insbesondere Steiermarks, Kärntens und Krains. Stuttgart, Engelhorn, 1889: 8vo., pp. 176. Price 5s. 6d.

This belongs to the series of publications issued by the "Centralkommission für wissenschaftliche Landeskunde von Deutschland," under the title of 'Forschungen zur Deutschen Landes- und Volkskunde.' This memoir is an excellent example of minute German research. The author goes back to the remotest period for which evidence can be obtained, and traces the movements of the population in Styria, Carinthia, and Carniola. The ethnological importance of the memoir is evident, but it will also be found serviceable in a thorough study of the geography of the region.

[Spain].—Voyage pittoresque et historique de l'Espagne. Paris, 1806: large folio, pp. x. and 72, maps, plans, and plates. [Presented by the Intelligence Department, War Office.]

ASIA.

Bell, [Colonel] Mark Lever [V.C., A.D.C., Bengal Engineers].—A Visit to the Kárún River and Kúm. 'Blackwood's Magazine,' April, 1889, pp. 453-481.

Colonel Bell, who has recently returned to England, after doing excellent service in Central Asia in connection with the Indian Intelligence Department, describes in this article a journey which he made in 1884, up the Kárún river and on to Kúm, and down by Isfahan and Bushire. As the narrative is quite original, and as there is a special interest at present in the Kárún river, Colonel Bell's contribution to a knowledge of this part of Persia is welcome. It is accompanied by a map showing routes in South-west Persia.

Fournereau. L.—Les Ruines Kmers du Cambodge-Siamois. Paris, Société de Géographie, 1889: 8vo., pp. 37. [Presented by the Author.]

Griqualand West.—Road Reports. Prepared in the Intelligence Branch of the Quartermaster-General's Department, Horse Guards, War Office. London, Harrison & Sons, 1884: 8vo., pp. 38, map. [Presented by the Intelligence Department of the War Office.]

Hurgronje, [Dr.] C Snouk.—Mekka, mit Bilder-Atlas. Herausgegeben von "Het Koninklijk Instituut voor de Taal-, Land- en Volkenkunde van Nederlandsch-Indië te 's-Gravenhage." II. Aus dem Heutigen Leben. Haag,

Martinus Nijhoff, 1889: 8vo., pp. xviii. and 397. [Presented by his Excellency the Minister for the Netherlands.]

In a notice of Part I. of this work, published in the 'Proceedings' for November last, it was stated that a second part was in progress which would describe the inhabitant of Mecca such as he is at the present hour. This part has now appeared, and supplies very full information on the subject treated. It is divided into four sections, i. e. Outer Life; Family Life; Learned Life; and one under the heading "Die Djáwab." Of the latter term the Arabic signification comprehends the population of the Malay Archipelago, from Siam and Malacca (north and north-west) to New Guinea (south and south-east)—a geographical range implied in the native expression of "Countries of Java" (*Bilád el Jáwa*).

Our author had great opportunities for becoming acquainted with the sayings and doings, and manners and customs of the inhabitants of Mecca, and of the pilgrims from foreign shores whose appearance on the sacred soil brings an unfailing income to the local sheikhs. His long residence on the spot—which he was forced to abandon owing to seizure and summary ejection—evident personal aptitude for research, and natural powers of observation, rendered him a trustworthy chronicler both as regards the people and their Turkish rulers. The account he gives of the pilgrim visitors shows that Muslim is not always welcomed by Muslim with the open arms of brotherhood and the open hand of hospitality. When, for instance, these come from Java, it is recorded that the caravan enters Mecca surrounded by noisy "street-boys and donkey-drivers uttering insulting and mocking cries, accompanied by derisive gestures."

The whole work is interesting and instructive, and should take its place among standard books of reference. Many of the details furnished in respect of the Arab colonists and other native subjects of Holland in the regions bordering on the Equator—more particularly of their pilgrim life—are of considerable importance viewed only as a contribution to physical geography, and must be of special value to the Dutch Government. They may be profitably read in connection with M. Van den Berg's official record of the Hadhramout noticed in the 'Proceedings' for August 1887. It is a matter of regret, if not of surprise that, according to Dr. Snouk Hurgronje, the report made by Indian Mahomedans in Mecca of their English governors is not so favourable as Anglo-Indian optimists would lead their pupils to suppose the case.

A set of illustrations enhances the completeness of the second, as it added to the value of the first part of this very full report of the headquarters of Islam, and calls for marked commendation.—F. J. G.

Minicoy: The Island of Women. 'Blackwood's Edinburgh Magazine,' Feb. 1889, pp. 197-213; March, 1889, pp. 307-323. 8vo.

An interesting account of a visit to Minicoy, with a description of the island, the people, their life and customs.

Oldham, R. D.—A Bibliography of Indian Geology; being a List of Books and Papers relating to the Geology of British India and adjoining countries, published previous to the end of A.D. 1887. Preliminary Issue. Calcutta, 1888: 8vo., pp. xiii. and 145. Price 1 rupee 8 annas.

Rodler, [Dr.] Alfred.—Bericht über eine geologische Reise im westlichen Persien. Wien, F. Tempsky, 1889: 8vo., pp. 12.

Street's Indian and Colonial Mercantile Directory for 1888-89. Twelfth issue. London, Street & Co. and Street Bros., 1888: large 8vo., pp. 1372 and 284, maps. Price 25s. [Presented by Messrs. Street & Co.]

Contains a deal of mercantile information relating to India and the Colonies, China, Japan, the Eastern Archipelago, Java, Philippine Islands, South and Central America, &c.

Svoboda, [Dr.]—Futschau-fu am Minflusse. Von der Reise S.M. Corvette "Aurora" nach Ostasien. [Wien], 1888: 8vo. [Presented by the Author.]

—Annam und das französische Cochinchina. Von der Reise S.M. Corvette "Aurora" nach Ostasien [Wien], 1888: 8vo., map and illustration. [Presented by the Author.]

Windt, H. [de]—From Pekin to Calais by Land. London, Chapman & Hall, 1889: 8vo., pp. x. and 647. Price 20s. [Presented by the Publishers.]

Mr. de Windt made the journey simply to see how it could be done. He does not profess to be a traveller, but merely a "globe-trotter"; exploration was not in his programme. The journey either way has been more frequently made than he seems to be aware of, and we should have thought he could have obtained some useful information from Dr. Lansdell's book. Mr. de Windt went from Pekin to Kalgan, across the Gobi Desert to Kiakhta, thence to Tomsk via Lake Baikal, Irkutsk, and Krasnojarsk, on by the Obi and Irtysh rivers to Tobolsk and Tiumen, whence Moscow was within easy reach. The book is entertaining reading, and to any one contemplating a similar journey will be useful. Much of the space is devoted to Irkutsk and Tomsk and the region between, and Mr. de Windt's account of the two cities and the country between them contains a good deal not generally known. The map is very poor, and the illustrations not equal to the text.

AFRICA.

[Mr. Stanley's Expedition.]—Major Barttelot's Camp on the Aruhwimi. With Chart of a portion of the Upper Congo, and Plan of Camp. 'Blackwood's Edinburgh Magazine,' Feb. 1889, pp. 153-179. 8vo.

An account of a visit to Major Barttelot's Camp at Yambuya, on the Aruhwimi, with a description of the Upper Congo, by one who knows it well.

Carvalho, Henrique Augusto Dias de—Expedição Portuguesa ao Muatânva. Methodo pratico para fallar a Lingua da Luanda contendo narrações historicas dos diversos povos. Lisboa, Imp. Nacional, 1889: 8vo., pp. 64. [Presented by the Author.]

Coello, F.—La Cuestión del Río Muni. Conferencia pronunciada por el Excmo. Sr. D. Francisco Coello el 9 de Enero de 1889 en Reunión Pública de la Sociedad Geográfica de Madrid. Madrid, Estab. Tip. de Fortanet, 1889: 8vo., pp. 33, maps.

Cosson, [Major] E. A. de—Days and Nights of Service with Sir Gerald Graham's Field Force at Suakin. London, John Murray, 1886: 8vo., pp. x. and 343, plan and illustrations. Price 14s. [Presented by the Author.]

Haly [Lieut.-Col.], R. H. O'Grady—The Nile above the Second Cataract. Précis of Information. Compiled in the Intelligence Branch of the Quarter-master-General's Department. Part I.—Sarras to New Dongola. Part II.—New Dongola to Abu-Hamed and Khartûm. London, Harrison & Sons, 1884: 8vo., pp. 60, maps. [Presented by the Intelligence Department of the War Office.]

[Madagascar.]—The Antananarivo Annual and Madagascar Magazine. Edited by the Rev. J. Sibree, F.R.G.S. No. xii. 1888. Antananarivo, L.M.S. Press, 1888: 8vo., pp. iv. and 397-524.

The leading paper in the new number of this very useful magazine is a review by Mr. Sibree of a quarter of a century's change and progress in Madagascar, and especially in Antananarivo. Mr. Sibree does not seek to conceal the shadows of the picture which he draws, but on the whole it is highly satisfactory. Mr. Sibree's translation of M. Grandidier's scientific researches in Madagascar is continued. Mrs. J. Birch-Grevinck contributes a translation of the Rev. J. Nielsen-Lund's travels and perils among the wild tribes of the

south of Madagascar. As the narrative deals mainly with the little-known Bara Country, it is a welcome addition to our knowledge of Madagascar. The Bara Country, Mr. Lund states, is very sandy and stony, dry and unfertile. This is also the case as regards a part of the Tanosy Country, near the Onclaly. In the dry season one very seldom sees even a cloudy sky, to say nothing of rain; the air is exceedingly hot, and the vegetation suffers very much, so that in many places it is a long distance between each root of grass, and what grass is seen is dry and faded. But, Mr. Lund states, the trees seem to have a greater power of resistance to dryness, and many kinds of trees are green all through the rainless season, and the leaves are used to feed the cattle. But there are many river-beds, and even if these are almost dry there is a pretty fair vegetation along them. On the vast plains in the Southern Bara Country, which are covered with grass, heather, and brushwood, one can see from a long distance the direction of the river-beds from the lofty luxuriant trees growing along them. The people settle wherever water can be conducted over the fields. Another interesting contribution by Mr. Sibree is a paper on the volcanic lake of Tritriva, lying in the curious volcanic region about 80 miles S.S.W. of Antananarivo. Other original contributions are on Rice and Rice Culture in Madagascar, by Miss C. Herbert; and some curiosities of topographical nomenclature by Mr. Pickersgill; besides varieties in geology, botany, and natural history.

Nozet-Elhadi.—*Histoire de la Dynastie Saadienne au Maroc (1511-1670)*, par Mohammed Essegghir ben Elhâdj ben Abdallah Eloufrâni. Texte Arabe publié par O. Houdas [1st Part.] [Vol. II. of Publications de l'École des Langues Orientales Vivantes.] Paris, E. Leroux, 1888. Price 15 francs. [Presented by the French Minister of Public Instruction.]

Rat, J. Numa.—*The Elements of the Hansa Language, or a short introductory grammar of the language.* London, Waterlow & Sons, 1889: 12mo., pp. vi. and 60. [Presented by the Secretary of State for the Colonies.]

AMERICA.

[**America, Central.**].—*Biologia Centrali-Americana; or Contributions to the knowledge of the Fauna and Flora of Mexico and Central America.* Edited by F. Ducane Godman and Osbert Salvin. Archaeology. By A. P. Maudslay. Part I. (text) 4to. and (plates) oblong 4to. [February, 1889.] London, R. H. Porter, and Dulau & Co. [Presented by Mr. Maudslay.]

[**America, United States.**].—*Department of the Interior, United States Geological Survey, J. W. Powell, Director. Mineral Resources of the United States, Calendar year 1887.* David T. Day, Chief of Division of Mining Statistics and Technology. Washington, Government Printing Office, 1888: 8vo., pp. vi. and 832.

The total value of the mineral product of the United States amounted in 1887 to \$538,056,345, as compared with \$465,000,000 in the previous year: the total production of coal for the year was 124,015,255 short tons, valued at \$173,595,996, as compared with 107,682,209 short tons, valued at \$147,112,755, in 1886.

[**Argentine Republic.**].—*Primer Censo General de la Provincia de Santa-Fé (República Argentina, America del Sud) verificado bajo la Administración del Doctor Don José Galvez el 6, 7 y 8 de Junio de 1887.* Gabriel Carrasco, Director y Comisario General del Censo. Libros II a VIII. Buenos Aires, 1888: 4to., pp. lxiv. and 184, maps and plates.

This Part deals with the Agriculture, Cattle Rearing, Industry, Commerce, Ways of Transport and Communication, Administrative and Social Institutions, &c., of the Province of Santa-Fé.

[**Buenos Ayres.**]-Censo General de Poblacion, Edificacion, Comercio é Industrias de la Ciudad de Buenos Aires, Capital Federal de la República Argentina. Levantado en los dias 17 de Agosto, 15 y 30 de Setiembre de 1887 bajo la administracion del Dr. Don Antonio F. Crespo y compilado por una Comision compuesta de los Señores Francisco Latzina, Presidente, Manuel C. Chueco y Alberto B. Martinez, Vocales, Dr. Don Norberto Perez, Secretario. Tomo primero. Buenos Aires, Compania Sud-Americana de Billetes de Banco, 1889: sm. folio, pp. vii. and 544, plans, diagrams, plates. [Presented by F. Latzina, General Director of Statistics, Buenos Ayres.]

Includes a deal of geographical and historical information relating to Buenos Ayres.

[**Nicaragua.**]-The case of the Republic of Nicaragua, submitted to His Excellency Hon. Grover Cleveland, President of the United States, Arbitrator, under the Treaty of Guatemala of December 24th, 1886. Washington, D.C., Gibson Bros., 1888: 8vo., pp. 39.

Whitney, J. D.-The United States: Facts and Figures illustrating the Physical Geography of the Country, and its Material Resources. Boston, Little, Brown, & Co., 1889: 8vo., pp. xi. and 472. [Presented by the Author.]

This is an expanded form of the article which appeared in the last edition of the 'Encyclopedia Britannica.' The information seems to have been worked pretty well up to date, fresh statistics having been added to various important items, such as the produce of the metals, of coal, petroleum, the more important cereals, cotton, &c. The volume is divided into eleven parts as follows:—Part I.—Physical Geography and Geology. Part II.—Political and Natural Sub-divisions. Part III.—Climate. Part IV.—Nature and Distribution of the Forests and of Vegetation generally. Part V.—Scenographical. Part VI.—Population and Immigration. Part VII.—The Public Lands. Part VIII.—Mineral Resources. Part IX.—Agriculture. Part X.—Manufactures. Part XI.—Foreign Commerce. There is also an Appendix in which various matters connected with the discovery and scientific development of the country are discussed.

Williams, William.-Climbing Mount St. Elias. 'Scribner's Magazine,' April 1889, pp. 386-403.

This is an interesting and richly illustrated account of the expedition to Mount St. Elias, in which Mr. H. W. Topham took part, in the summer of 1888.

ARCTIC.

[**Arctic Exploration.**]-Report on the Proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land. By Adolphus W. Greely. Washington, 1888: 2 vols. 4to.; vol. i., pp. viii. and 545; vol. ii., pp. vi. and 738. [Presented by Brigadier-General A. W. Greely.]

This is the official report of the memorable Arctic expedition of which General Greely has already published full details. The present report, however, must be consulted by any one desirous of obtaining a knowledge of the full results of the expedition. The report of the commanding officer covers only about 100 pages, and is in the form of a diary. As appendices to this in the first volume are a variety of documents, including special reports on the various expeditions sent out from headquarters under Lieut. Kistingbury, Lieut. Lockwood, Serjeant Brainerd, Dr. Pavy, and others; as also detailed reports on observations of various phenomena of interest to science. There are also medical reports, and a variety of official documents, letters, &c., which afford a glimpse into the somewhat sad internal life of the expedition. The second volume is entirely occupied with scientific observations, including a great variety of

descriptions and tables in natural history, meteorology, magnetism, tidal observations, and pendulum observations. There are many special and original illustrations, besides maps and charts.

[Greenland.]—Den Ostgrønlandske Expedition udført i aarene 1883–85, under Ledelse af G. Holm. Kjøbenhavn, Kgl.-Bogtrykkeri: 8vo., Første Del, 1889, pp. [x.] and 352; Andere Del, 1888, Text, pp. [iv.] and 360; Tavler. With Résumé of the two volumes in French. [Presented by Captain G. Holm.]

This is the detailed account of the expedition to East Greenland, which did excellent work during the years 1883–85. The aim of the expedition was mainly antiquarian and ethnological; to gather what information was obtainable concerning the old Icelandic settlements in this part of Greenland, and in connection therewith to study the earlier population. From this point of view the information collected is of great interest. At the same time the expedition made valuable observations on the geology, geography, and especially the glacial conditions of the region visited, and the results are contained in the text and the excellent maps and many illustrations which accompany the volumes. One volume consists entirely of plates, containing many photographs of the natives and beautifully executed coloured illustrations of their implements, weapons, utensils, clothing, &c. The region dealt with extends from the south coast to about 68° N. lat. In the first volume, the first chapter, by Professor Steenstrup, is devoted to a discussion of the situation of Osterbygd. The second chapter contains the Report of Captain Holm and Lieut. Garde and the result of the expedition of 1883–85. The principal results may be thus summarised:—Graah's map of the east coast of Greenland has been corrected and completed; a map has been prepared of a part not previously surveyed, and now named Christian IX. Land; and after sketches and information from the natives, the outline of the coast has been continued from 66° to 68½° N. lat. It was found that the country called after Christian IX. was inhabited by a branch of the Eskimo which, before the arrival of the expedition, had not been in contact with Europeans. Detailed observations have been made on their mode of life, their customs, language, legends, &c., and a large collection made of articles of ethnological interest. During the various journeys of the expedition, and especially in their winter quarters, systematic researches were made in the physical geography of the country. Geological and botanical observations were made and specimens collected along the east coast. It was found that the east coast of Greenland is not so inaccessible as has hitherto been supposed. The expedition explored the east coast as far to the north as it was at all likely Osterbygd could have been located, without discovering the least trace of buildings which were not of Eskimo origin; and without finding anything in the physiognomy, the customs, mode of life, legends, of the natives, that could furnish the slightest ground for inferring former relations with Europeans. From this it is concluded that Osterbygd could not have been situated on the east coast of Greenland. The third chapter deals with the Geography of Danish East Greenland, i. e. as far as 66° N. The French résumé gives this section in considerable detail. This part of the east coast is divided into five natural zones:—1. The most southerly part as far as Anarket; 2. from Anarket to Ikermiut; 3. from Ikermiut to Igdlolnarsuk; 4. from Igdlolnarsuk to Inigsalik; 5. The section which extends to the east of the last-named place. Zones 1, 3 and 5 have strong resemblances with each other, as also zones 2 and 4. The three first-mentioned zones are cut by deep fjords, crowned with lofty serrated mountains, never covered by the continental ice. Some places are characterised by a vegetation comparatively rich. Beneath the mountains there are, in general, numerous glaciers, which often descend to the fjords, and towards the interior is found a mountainous region filled with large local glaciers. Zones 2 and 4 have a different aspect. The country is very barren, and the continental ice descends almost directly to the sea, or to the edge of the fjords, only a few mountains or rounded groups of mountains emerging from the ice. Another characteristic of the east coast is the parallelism of most of the fjords in an E. ½ S. direction, as compared with the S.W. direction of the fjords on the west

coast. The fourth chapter deals with the geology of the east coast; chapter five with the plants collected; chapter six with the meteorology; chapter seven with the magnetism and the aurora, as also with the tides; while chapter eight gives a list of names of places in East Greenland.

The second volume, with its accompanying volume of illustrations, deals almost entirely with the ethnology of East Greenland. The first chapter treats of the anthropology of the East Greenlanders. The second chapter, by Captain Holm, assisted by some of his companions, is a special ethnological study of the inhabitants of Angmagsalik. The third chapter gives a nominal list of the inhabitants of the East Coast of Greenland, with their ages, the number of kayaks, of women's boats and tents. At the date of the census, 1884, there were 245 men and 303 women, with 151 kayaks, 33 women's boats, 49 tents and 20 horses. Chapter four, by Dr. Rink, treats of the dialect of East Greenland, and chapter five of the legends and stories of Angmagsalik. The concluding chapter is an explanation of the various plates.

[Greenland.]—Om Inlandisen i Grönland. I Anledning af Dr. Nansen's Expedition, af J. A. D. Jensen.—(On the Inland-ice of Greenland. An introduction to Dr. Nansen's Expedition.) Copenhagen, 1888, 73 pages, with 40 woodcuts and a map.

Captain Jensen, an officer of the Danish Navy, who himself took an active part in the exploration of the coasts of Greenland during the years 1879–1885, has given in this little work an interesting, short account of the explorations which have been undertaken of late in order to ascertain the extension and structure of the inland-ice. The author's excursion, which was made in 1879, and during which excursion the party explored the great glacier of Frederikshaab, is spoken of at some length, and the whole is profusely illustrated by woodcuts, taken from that treasury of information 'Meddelelser om Grönland.' As to Dr. Nansen's expedition, nothing is yet known of it besides the short letters written by himself and Mr. Sverdrup on their arrival at Godthaab, and already mentioned in the 'Proceedings.' Some biographical details about Dr. Nansen's former career are not devoid of interest. We learn from them that the traveller is not only a passionate hunter who has submitted himself, before starting for his journey, to a rude practical training in journeys over the Norwegian fields, but that he is also a promising artist. So we may expect to see his full report well illustrated.

[International Polar Observations.]—Die Internationale Polarforschung, 1882–1883. Beobachtungs-Ergebnisse der Norwegischen Polarstation Bossekop in Alten. Im Auftrage des Königl. Norwegischen Cultus-Ministeriums herausgegeben von Aksel S. Steen, Erstem Assistenten am Norwegischen Meteorologischen Institute. II. Theil, Christiania, Grøndahl and Søn, 1888: 4to, pp. 73, 89, 12, and 127, plates. [Presented by the Norwegian Government.]

This volume deals with the magnetism of the earth, and the Northern Lights.

AUSTRALASIA.

Bonaparte, [Prince] Roland.—La Nouvelle Guinée. III^e Notice. Le Fleuve Augusta. Paris, 1887: Small 4to., pp. vii. and 16. IV^e Notice: Le Golfe Huon. Paris, 1888: pp. 62. [Presented by the Author.]

In the previous memoirs Prince Roland Bonaparte gave the results of the various explorations made during the past few years by the Dutch in the western half of New Guinea. In the III^e notice he gives the results of the efforts made by the Germans to penetrate into the interior of the country by following the course of the recently-discovered river named Augusta. The paper is accompanied by a map.

The IV^e notice deals in much more detail with the exploration of Huon Gulf. The earlier explorations are briefly summarised, but most of the space is devoted to an account of the work done by the Germans, and especially by Dr. Otto Finsch. There are several well-executed maps.

[New South Wales.]—Results of Meteorological Observations made in New South Wales during 1886, under the direction of H. C. Russell, B.A., F.R.S., Government Astronomer of New South Wales. Sydney, C. Potter, 1888: 8vo., pp. 186 and 192, diagrams. Price 3s. 6d. [Presented by H. C. Russell, Esq.]

—Results of Rain, River, and Evaporation Observations made in New South Wales during 1887: H. C. Russell, B.A., F.R.S., Government Astronomer for New South Wales. Sydney, C. Potter, 1888: 8vo., pp. 99, map and diagrams. Price 2s. 6d. [Presented by H. C. Russell, Esq.]

OCEANIA.

Alexander, [Prof.] W. D.—A Brief Account of the Hawaiian Government Survey, its Objects, Methods and Results. Honolulu, 1889: 8vo., pp. 26.

Jouet, [Le P.] Victor.—La Société des Missionnaires du Sacré-Cœur dans les Vicariats Apostoliques de la Mélanésie et de la Micronésie. Issoudun (Indre), 1887: 8vo., pp. 346. [Presented by M. A. Mortureux.]

This interesting volume is mainly devoted to the work of the Roman Catholic missionaries in New Guinea, carried on from their stations on Thursday Island, York Island, and Yule Island. It also refers to their work in New Britain and the Gilbert Islands. Although the volume is naturally largely occupied with the special work of the missionaries, the book involved a good deal of going about and opening up of new country. To the journey recording the exploration of the river St. Joseph, which debouches into Hall Sound, and the country lying to the east, considerable space is given. The volume is likely, therefore, to be useful to those studying the region with which it deals.

GENERAL.

Blytt, A.—The probable Cause of the Displacement of Beach-lines. Second additional note. [1889.] 8vo.

Brown, Robert [Ph.D., F.L.S.]—Our Earth and its Story; a Popular Treatise on Physical Geography. Vol. ii. London, Cassell & Co., 1888: 4to., pp. viii. and 376. Price 9s. [Presented by the Publishers.]

This is the second volume of the work noticed in the 'Proceedings' for 1888, p. 318. The volume is very largely geological; that is, Dr. Brown endeavours to describe the geography and life of the successive great geological periods. Under the Quaternary Period he deals with Prehistoric Man and his dwelling-place. The concluding chapters treat of the geographical distribution of living beings; the agents concerned in the disposal of plants; the distribution of plants in stations and climatic zones, and into botanical regions, and the origin of floras of different regions. The volume is well supplied with illustrations and maps.

The Encyclopædia Britannica; a Dictionary of Arts, Sciences, and General Literature. Ninth edition. Index, with List of Contributors and Key to their Initials. Edinburgh, A. & C. Black, 1889: 4to., pp. vi. and 499. Price 20s. [Presented by the Publishers.]

This exhaustive and well-printed index greatly increases the utility of the great work which it brings to a conclusion. Each page contains three columns, and altogether there are some 50,000 entries. From the geographical point of view it is particularly valuable, as it enables one to find at once all that the work contains on any particular subject; necessarily, in many cases, the information is often scattered among several volumes. Among the 1000 contributors whose names are appended, geography is well represented.

Jahrbücher der K. K. Central-Anstalt für Meteorologie und Erdmagnetismus. Officielle Publication. Jahrgang 1887. Neue Folge. XXIV. Band. Wien, 1888: 4to., pp. xviii., 272, and 107.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

EUROPE.

Deutschen Reiches.—Karte des —, Scale 1 : 100,000 or 1·3 geographical miles to an inch. Sheets Nos. 351, Sobotka ; 376, Mixstadt ; 603, Bühl ; 620, Markkirch ; 656, Mülhausen i. Elsass. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1888. Price 1s. 6d. each sheet. (*Dulau.*)

Makedonien und Alt-Serbien.—Ethnographische Karte von —. Von Spiridion Gopčević. Scale 1 : 750,000 or 10·3 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1889, Tafel 4. Gotha, Justus Perthes. (*Dulau.*)

Meuse.—Plan de la —, de Namur à Dinant, à l'échelle de 1 : 20,000 or 3·6 inches to a geographical mile: avec prolongement jusqu'à Waulsort, Hastieres et Hermeton, par Joseph Kips. Namur, M. Balon. Price 10d., or coloured 1s. 0½d.

Oesterreich-Ungarn.—Sprachen-Karte von —, bearbeitet nach den durch die Volkszählung vom 31. December, 1880, für jede einzelne Gemeinde erhobenen Daten. Scale 1 : 1,000,000 or 13·6 geographical miles to an inch. Von Dr. Franz Ritter von Le Monnier. Wien, 1888, Hölzel. 4 sheets. Price 15s. (*Dulau.*)

Oesterreichisch-Ungarischen Monarchie.—Specialkarte der —, Scale 1 : 75,000 or 1 geographical mile to an inch. K.k. militär-geografisches Institut, Wien. Sheets: Zone 27, Col. XX., Janja; 28—XX. Zvornik; 31—XVI, Županjac und Cista; 31 — XXI, Bičolobrd; 32 — XX, Vikoč. Price 1s. 4d. each sheet. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of March 1889.

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Miscellaneous:—

ENGLAND. Berks. Index Map (scale 1 inch to a mile), 2s. 6d.

(Stanford, Agent.)

AFRICA.

Afrika.—Karte von Emin Pacha's Gebiet und den Nachbarländern. 1:3,000,000 or 41·6 geographical miles to an inch. Von J. I. Kettler. Weimar, Geogr. Institut. Price 1s. (Dulau.)

Deutsch-Ostafrika.—Spezial-Waukkarte von —. Scale 1:3,000,000 or 41·6 geographical miles to an inch. Von J. I. Kettler. Weimar. Geograph. Institut. Price 9s. (Dulau.)

Herero Land und Angrenzende Gebiete. Nach vorhandenen Karten und eigenen Aufnahmen entworfen und gezeichnet von Franz Freiherrn von Steinaecker. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Petermann's Geographische Mittheilungen, Jahrgang 1889, Tafel 5. Gotha, Justus Perthes. (Dulau.)

Ostafrika.—Handkarte der deutschen Schutzgebiete in —. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Redigirt von J. I. Kettler. Weimar, Geograph. Institut. Price 2s. (Dulau.)

CHARTS.

United States Charts.—No. 1127. Great Circle Sailing Chart of the North Pacific Ocean. — Pilot Charts of the North Atlantic Ocean for March and April 1889. Published at the Hydrographic Office, Navy Department, Washington, D.C. G. L. Dyer, Lieut. U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Berghaus' Physikalischer Atlas.—(Begründet 1836 von Heinrich Berghaus.) 75 Karten in sieben Abtheilungen, enthaltend mehrere hundert Darstellungen

über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und unter Mitwirkung von Dr. Oscar Drude, Dr. Georg Gerland, Dr. Julius Hann, Dr. G. Hartlaub, Dr. W. Marshall, Dr. Georg Neumayer und Dr. Karl v. Zittel. Herausgegeben von Prof. Dr. Hermann Berghaus. Achtzehnte Lieferung. Inhalt: Nr. 21, Seeströmungen. Nr. 42, Magnetische Intensität. Nr. 67, Europa um 1880. Gotha, Justus Perthes, 1889. Price 3s. (*Dulau*.)

Levasseur, E.—*Petit Atlas de la Géographie Économique et des Forces Productives du Monde*, par E. Levasseur, Membre de l'Institut, avec le concours de Ch. Périgot, Professeur au Lycée Saint-Louis. Cinquième Année. Première Édition. Enseignement Secondaire des Jeunes Filles. Paris, Librairie Ch. Delagrave. Price 8s. (*Dulau*.)

This little atlas contains a large amount of information with reference to the means of communication, products, and industries of the world. The maps, owing to the size of the atlas, are necessarily drawn on small scales, but care has been taken not to overcrowd them with names, and to make plain by a system of underlining the products indicated in each. Special subjects are dealt with on separate maps, and the atlas concludes with a series of maps of the French possessions.

Longman's New Atlas.—Political and Physical, for the use of schools and private persons. Consisting of 40 quarto and 16 octavo maps and diagrams, besides insets, and 16 quarto plates of views, &c. Engraved and lithographed by Edward Stanford. Edited by George G. Chisholm, M.A., B.Sc. London: Longmans, Green, & Co., 1889. Price 12s. 6d.

This atlas is designed principally for the use of schools, and contains several novel features. Facing the title-page is a sheet on which are plans and sections of maps, drawn on all the scales used in the atlas. As these are all multiples one of the other, it is easy to make a direct comparison of the linear distances on any two maps, and this sheet will also be useful in conveying to the scholar an intelligent idea of the meaning of the figures by which the natural scale of a map is expressed. Specimens of the methods of engraving and representation adopted in ordnance surveys, contour lines, and sections are also given.

The physical maps at the commencement of the book are, as a whole, good. Worthy of special commendation are the astronomical diagrams, the sheet of projections, the systems of hill drawing, and the meteorological maps. The map showing the ocean currents, periodical rains, and drainage, is, however, overcrowded with symbols, the result of trying to give more information than the size of the sheet admits.

The continents, except Europe, which is drawn on the same scale as Australia, are on one scale, as are also the British Isles and most of the larger countries of Europe, while the smaller countries, shown separately, are on an enlarged scale. In all the maps which are political as well as physical the areas that are less than 1000 feet above sea-level are distinguished by a separate colour. The depths beyond the 100-fathom line are indicated by a shade of blue, those under that depth are left uncoloured, or nearly so; and this gives the maps a very unfinished appearance. It would have been better if two closer shades of blue had been used, and if the depths had been given, as the heights are, in feet.

No less than eight maps are devoted to the British Isles. On these are clearly shown the physical features, the geology, rainfall, political divisions, density of population, &c. Prominence is also given to most of the British Colonies, while for other countries physical and political features are combined in the same sheet, and in many instances, districts of particular interest, or plans of cities, are exhibited on inset plans. The atlas contains in all forty-eight principal maps, with numerous insets. The maps are not overcrowded with names, and those that appear have been well chosen. It might have been better if separate maps of the physical and political features of at least the

principal European countries had been given in juxtaposition throughout the atlas; and in some sheets, at any rate, the political divisions might with advantage be less heavily marked. A good physical map of the Alpine chain, such as is common in German atlases, and a map illustrating glacier phenomena by a single instance, e. g. a reduction of Heim's map of the Aletsch Glacier, should be added in future editions.

The remaining sheets are occupied by a series of illustrations which are intended to exhibit typical scenes from different parts of the world. These are fairly drawn, but roughly lithographed. In many cases they fulfil the purpose intended; in others, however, they represent exceptional, rather than typical scenery; as, for example, in the subtropical vegetation shown in "A scene on the Scilly Islands."

There is, no doubt, considerable difficulty in obtaining and producing representations that will, without the aid of colour, convey to the student any clear and accurate idea of the leading features of the landscape of different parts of the globe, or of prominent phenomena such as volcanoes, snow-mountains, landslips, river-gorges, coral islands. In all such attempts, quality should be set before quantity. No illustrations should be given that are not essential; and photographs should, as a rule, be preferred as material. There are not a few plates here that do not come up to the suggested standard. There can be no reason why the picturesque portion of an atlas should be inferior to the illustrations in an American monthly magazine. But, such as they are, these cuts (which we will not criticise individually) mark an experiment that was worth making, and they will doubtless be appreciated by, and useful to, young students.

Although open to some modifications and improvements in detail, "Longman's New Atlas" is, taken as a whole, a decided success, and is very superior to any of its class yet published in this country. Its producers may be congratulated on having taken a long step in the direction in which it has been the object of the Council to urge English publishers. The work is well suited for the object its editor had in view—use in schools, and it may also be useful for ordinary purposes as a reference atlas.—D. W. F.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von ——. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Zehnte (10) Lieferung. Inhalt: No. 3, Gebiet der Sonne, von H. Berghaus. No. 34, Spanien und Portugal, Blatt 2 in 1:1,500,000 von C. Vogel. No. 45, Ost-Europa, Blatt 2 in 1:3,700,000, von A. Petermann. Gotha, Justus Perthes, 1889. (*Dulau.*)

Sheet No. 3 contains illustrations of the Solar system, eclipses, phases of the moon, and various other astronomical phenomena. Sheet No. 34 is a map of the south of France, the north-eastern portion of the Spanish Peninsula, the island of Minorca, and the northern extremity of Majorca. Sheet No. 45 includes the north-eastern portion of European Russia, from the 33° of East longitude to the Ural Mountains. The astronomical diagrams are beautifully drawn, and the maps are both fine specimens of cartography.

PHOTOGRAPHS.

Caucasus.—Autotype enlargements of photographs of Koshtantau and Djanga, taken by Hermann Woolley, Esq., in 1888, and presented by him (with several small views) to the Royal Geographical Society.

These are two very fine specimens of enlargement by the autotype process from small photographs, and are both highly characteristic views of Caucasian mountain scenery.

Marocco.—34 photographs of Marocco taken by Mon. H. M. P. de la Martinière, 1887-8, and presented by him to the Royal Geographical Society.

These are a very interesting set of views of the scenery and architecture of Marocco.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Explorations on the Welle-Mobangi River.

By Captain VANGELE

(Read at the Evening Meeting, February 25th, 1889.)

Map, p. 404.

THE river Welle was discovered in 1870, by Dr. Schweinfurth, on his memorable journey to the Niam Niam country. The Ubangi, or Mobangi, was first seen on the 18th April in 1884, by Captain Hanssens. After the exploration of the river undertaken in 1885-6 by Mr. Grenfell, who succeeded in ascending it about 400 miles, reaching the fourth degree of north latitude, M. Wauters, in the April number of the 'Mouvement Géographique,' 1885, started for the first time the theory of the two rivers being one and the same, a theory he supported by clearly defined facts.

Between the first and last of the above dates various hypotheses regarding these rivers—the Welle-Shari, the Welle-Aruwimi, and the Welle-Tumbiri—were emitted and supported with more or less success by their propounders, and the discussion continued even after the discovery made by Mr. Grenfell and the journeys of Dr. Junker.

For various reasons quite unconnected with geographical science, it was in France that the theory connecting the Welle with the Ubangi was fought against with the greatest pertinacity, so much so, indeed, that the discovery of the English missionary was even denied.

It was at this time that the Government of the Congo Free State, anxious to possess for future negotiations positive information supplied by one of its own agents, gave me orders to take up and complete the exploration of the Ubangi.

At Leopoldville, the Administration placed the steamer *Henry Reed* at my disposal. The *Henry Reed* is a flat-bottomed boat with a stern paddle-wheel; a lighter fastened to one of the sides completed my means of transport. Three white men (Lieutenant Lienart, the captain of the steamer, and an engineer) and 40 negroes composed the party

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under my orders. I formed a store at Equatorville, and this position served me during two years as my base of operations.

On the 13th October, 1886, I entered the Ubangi, and on the next day came out within view of, but higher up than, the French post. I saluted the friendly flag, and continued on my way. Towards seven o'clock that evening, whilst we were bivouacking, a sentinel announced the approach of a canoe, we shouted to it to advance, and in a few minutes it reached the shore. In it was the officer commanding the French post, who came to warn me that he had orders to forbid access to the river. Basing myself on the decrees of the Conference of Berlin, which ensure free navigation on the Congo and all its tributaries, I refused to comply, but consented to take note of the protestation he then made, which put an end to this incident. The French post of Nkundja, now evacuated, was not established in an advantageous position, which explains why the Government of the Congo State did not occupy it after the last convention made with France, and which settled definitely the question of boundaries.

I renewed my provisions at Bisongo, and pushed on. We were then in the middle of October, the season when the river is at a high level, rendering it needless to look for the navigable channel amongst the numerous islands which dot its surface. In no part did I find less than six feet of water, and on the other hand no sounding ever gave me more than six fathoms. I was thus enabled to keep continually to the left bank when going up, and to the right one when coming down, so that we were able to decide in the most positive manner that the only tributaries as far as the fourth degree north latitude were the Ngiri on the left bank, and the Ibenga and Lobai on the right.

Though the immense volume of flowing water rendered our navigation much easier, it likewise made it very difficult for us to get the wood fuel necessary for the steamer, part of the wooded shores being under water. Fortunately I was able to buy some from the natives.

I will give here a few figures before going on with my description. Below the French post the Ubangi measures about 2730 yards in breadth; its greatest depth is five fathoms, its lowest one fathom; it flows at the rate of $3\frac{1}{4}$ feet a second. Under the 4th degree, just below the rapids, we find it still has a breadth of 1300 yards, a depth of four fathoms, and a velocity of four feet a second. Between these two points, though continually varying in breadth, it never exceeds about 4000 yards, including the islands. The general appearance of the river is pretty much the same as that of the Congo near Bolobo—strewn with islands, and having low wooded banks. The colour of the water is a light brown.

As regards habitableness and fertility, the left bank is vastly superior to the right, which, apart from the tribe of Ba-Loi, has no great centre of population. It is even to a great extent swampy. The left

bank, on the contrary, though having a few low-lying parts between Mon-Bolo and Imesa, which, however, are partially inhabited, is densely populated. From the mouth of the river to the rapids at Zongo we successively come across the tribes of the Mon-Bangi, the Ba-Loi, the Ba-Ati, the Mon-Zemba, and the Mon-Tumbi. The Mon-Bangi inhabit the left bank; their language is the same as, and their tattooings very similar to those of the people of Irebu. They are ivory merchants.

The Ba-Loi form an agglomeration of villages about 60 miles above the mouth of the river, and extending along both banks, but principally confined to the right. Ivory merchants, but especially pirates, they are the terror of the neighbouring tribes. When the river is high they pass in their canoes from the Ubangi into the Congo, through the small channels of the Ngiri, and make raids on the districts of Lulanga, Mokomela, and the Equator, carrying off numerous captives.

In one of their places, called Mando, I came across a young man from the Equator, captured four years before in one of these raids. I purchased his liberty, and restored him later on to his father, who for all thanks reproached me with bringing back his son almost naked!

The sole tattooing of the Ba-Loi consists in five small vertical stripes on the forehead, each composed of little horizontal lines. The territory of the Ba-Loi, of the Mon-Zemba, and Mon-Tumbi shows an uninterrupted succession of villages.

On the Upper Congo the only territories that can be compared to them for density of population are those of the Ba-Yanzi and the Bangala.

Beyond the region inhabited by the Ba-Ati the language changes entirely, and at the same time ivory utensils, mortars, and horns make their appearance. I stopped some time with the Ba-Ati (also called Mopoto), and established a real friendship with the chief, Ekwala. This country, situated under the third degree of north latitude, is composed of high land. The neighbouring districts of the Mon-Zembo and Mon-Tumbi are, on the contrary, low land. This first tribe is as honest as the second is treacherous. As I stated before, the population is very dense. Every morning two or three hundred canoes may be seen cutting their way through the water, carrying to their day's labour in the fields women and children, with a few warriors to protect them. Their fishing deserves special notice. Nowhere, except perhaps at Stanley Falls, have I seen it carried on on such a scale. Their traps are so heavy as to require for their transport two canoes lashed together. The laying down of these traps involves a sort of military ceremony; drums beat, and the different crews accompany each stroke of their paddles with a sharp, short cry. The men are very tall, five feet ten inches being the average height; some of the women are equally so; they have well developed chests and superb biceps. This high stature is universal amongst them, and one cannot help thinking of the ancient Spartan law.

The Ba-Ati are hardly tattooed at all; a few lines on the forehead. No special head-dress either is adopted, shaved heads being in the majority. It is far from being the same with the Ngombe, a tribe from the interior, with whom the Ba-Ati are closely related. The women of this tribe have a peculiar head-dress, with a long drawn-out chignon, such as the Monbuttu women, of whom Schweinfurth made a drawing. The Ngombe ladies fasten to the back of their heads a long veil of some native black stuff, which falls over the shoulders; thus clothed they present a most imposing appearance. Another peculiarity distinguishes these women—they carry their children in a little wicker basket slung round their necks by a sling made of banana fibre.

A characteristic sign of all these people, from Mon Yoka to Zongo, is that they extract the four upper incisors, because "it makes us beautiful," they told me. As a matter of fact, this deprivation of their teeth, far from rendering them repulsive, gives them rather an attractive look. The Ba-Ati women pierce one of their ears, and enlarging the hole till it reaches the size of a five-franc piece, place in it either a round bit of wood or a ring of six or seven coils.

During my subsequent voyage, after passing the rapids, we came upon another tribe, called the Mon-Ba-Ati, tattooed in the same way, and the lobe of the ear pierced just the same as the Ba-Ati. This is what I learnt concerning this analogy: In days gone by both these tribes formed one people in the interior, but being vanquished in some great war, they separated and settled on the banks of this river, which both call Dua. Another similitude proving their common origin is their language, greatly resembling that spoken on the Congo at Upoto.

The Ba-Ati are very fair workers in iron, although their forges are quite rudimentary: a hard bit of rock is their anvil; their hammer of beaten iron is all of one piece and consists of a square-shaped head and a handle. The blacksmith uses the corners of this square head to hollow out the blades of the knives and the iron heads of the spears. The furnace is blown by four bellows formed of antelope skins rendered supple by constant rubbing with oil. They are worked by strongly fastened wooden handles, the rise and fall of which expels the wind into wooden tubes, which convey it into one single baked earthen pipe which reaches the furnace.

Up to close upon the first rapids we are called by the name of Ba-Tandeley, evidently derived from Stanley.

In all this region, or rather from the Ba-Loi to Zongo, I found it impossible to get sight of a single slave. And yet the Ba-Ati make constant raids against the other tribes, but their only object is rapine and the procuring of meat. All that is killed is eaten on the spot; what is captured alive is carried off, and eaten as the occasion arises. I have met with one of these marauding expeditions; it was composed of about fifty canoes divided into vanguard and main body: and the meat I

mention is, it must be avowed, human flesh, for cannibalism exists on a large scale along the whole river and its tributaries. I have seen houses surrounded by a border of skulls for a distance of at least 28 yards. During the whole of my voyage I was unable to deliver a single one of these wretched creatures reserved for food, and this despite the most liberal offers.

"*It is meat,*" they always replied, "and we don't sell it." In fact, it is very characteristic that the names used to designate the man reserved for meat and the goat, whose destiny is the same, are almost similar, the first being *moboli* and the second *mboli*.

Food is very dear amongst the Ba-Ati, and even fowls they will only sell at a very high price. Goats are meat, they said, and asked me for one of my men as the price of one. I must say, notwithstanding, that I consider them as one of the finest native types inhabiting this region, and as a centre for future recruiting; but, like my friend Coquilhat had to do at Bangala, we must first tame these savages.

I have, perhaps, dwelt at rather great length on the subject of these Ba-Ati, but we will now once more proceed. After renewing with them our protestations of friendship, we started off, and four days later reached the fourth parallel of N. lat., where we came upon a group of mountains reaching in some instances a height of from 600 to 800 feet.

Through this rocky mass the Dua has to force a way to reach the Congo. At the entrance of the gorge, the river is compressed into a bed 870 yards wide, and I was stopped by a barrier of rock offering five passages, between which the rushing waters formed a fall and four rapids. I cast anchor in a little creek on the left bank, from which we were obliged to dislodge with our guns the quantities of crocodiles, whose habitual resort it was, and then I proceeded to reconnoitre the obstacle. Between the right bank and the first rock, forming together a wall, there is a small fall, which does not exist when the river is low, as I found out afterwards.

The second passage, 270 yards broad, gives vent to the great body of the water; it is a rapid, flowing at the rate of 10 miles an hour. The third and fourth passes showed by their whirling waters the existence of hidden rocks; finally the passage between the left bank and a small island formed a rapid of about seven or eight miles an hour. This was the way by which the natives came down the river; to go up they drag their canoes over the rocks along the bank. If we were to get up any further this was clearly the only way open to us. It must be remembered that the river was then at its highest level. (We were at the end of November.) However, just to satisfy my conscience, I made an attempt to get up by the big central rapid, but in vain. Twice more we vainly tried the pass along the left bank, and then I returned to camp.

During these attempts I had noticed that the pressure on the boiler

was 70 lbs., or $4\frac{2}{3}$ atmospheres. I resolved to make a last attempt with a higher pressure. I selected the hardest wood I could find for the furnace, and every man who was not absolutely indispensable on board was left on shore. The captain and engineman, visibly frightened, raised some objections, the latter nearly refusing to go, on the plea of being married and having children. With M. Leinart's help, and a bottle of champagne I revived their courage, and our fourth and last attempt was made with a pressure of 90 lbs., or nearly six atmospheres.

I started at full steam; the steamer cut through the water, then went slower and slower, till finally we stopped altogether and began to drift on to the rocky bank. I gave orders to put back; then came a critical moment, for the steamer, offering her broadside to the current as she turned, leant over heavily, and the water rushed in so as to make us fear for the fires. However, I finally regained my camp without accident.

The next day I tried once more, with M. Lienart's help, to get the lighter up, but without success. The natives informed us that higher up the river was even worse, but as to its direction, no information worthy of attention could be gained. The language, totally different from that of the Upper Congo, was quite unknown to us, and we had to correspond by signs.

Once more I returned to camp and began preparations for the return journey. I noticed that, whereas at Stanley Falls the population is very dense near the rapids, here only one village was to be found, that of Zongo on the right bank. I will not here raise the question as to whether the obstacles were too great to be overcome, my second voyage having fully answered that question.

Being thus stopped for the present, all I could do was to explore the tributaries of the Ubangi and the Dua below the Zongo rapids. I have already named them: the Lobai and the Ibenga on the right bank, the Ngiri on the left. The waters of the Lobai are rather darker than those of the Ubangi; its banks are wooded and in some places rise to a height of 30 feet. The population is widespread. About forty miles from the mouth of this river, I was once more stopped by a fall.

The waters of the Ibenga are black; its banks are low and in great measure covered with grass or dead trees still standing, a sign of frequent inundations. Navigation was very difficult on account of the great number of floating trees. Sixty miles up I was completely stopped by a barrier of trees. The river separates into numerous small channels. Elephants must be found in abundance, for ivory was to be had everywhere and very easily.

The Ngiri is a most interesting river. Coquilhat had already prepared me for its existence from information he had gathered from the natives during his canoe expedition up the Ibenga, a little channel forming a communication between the Ngiri and the Congo, a little below Bangala.

In the narrow peninsula between the Congo and the Ubangi, reaching to $1^{\circ} 20' N.$ lat., there is a valley from four to six miles broad, opening out in the Ba-Loi territory, and offering a succession of pools covered with grass and islands, in the midst of which flows this river that the natives calls Loi, and to which I gave the name of Ngiri—a name already known, recalling the hypothetical lake of Stanley's last map, and besides that being the name of an agglomeration of villages a little above the mouth of the river. The Ngiri has but a feeble current, its waters are very dark, and its course is so winding that frequently we described three-fourths of a circle whilst advancing. The Ibenga and the Itimbiri are equally tortuous.

At this time several villages were under water, and at the extreme limit of possible navigation we still had a depth of two fathoms; there the river separated into several little channels issuing from marshy forests.

It was most picturesque work sailing up these pools. Now and again we would lose the river and find ourselves in the middle of one of these grass-covered lakes where, nevertheless, soundings proclaimed a depth of two fathoms. To regain the river we had to sail across these green plains, which was easily managed with our boat, whose spur-like bow cut a channel through which the rear wheel pushed her along. If we had had a screw steamer this would have been impossible. When we wanted to land at some riverside village, once more we glided through the grass, whilst far behind numerous canoes followed in our wake, the natives using long poles to push themselves on, and producing a rather strange effect, as only their heads were visible.

In the way of landscapes nothing is to be seen but forests entirely composed of palm trees, then banana trees, and then villages, some on the banks of the ponds, others on the islands.

For 60 consecutive miles village succeeds to village in an uninterrupted chain. The dwellers on the river banks had, fortunately for us, made large stores of firewood, thanks to which we were enabled to continue our journey. This wood was sold more or less voluntarily. Sometimes we found the village deserted, which rendered our task much easier, as then we had only to leave behind us the price of what we took, which we generally paid in pocket handkerchiefs, which we left in the most visible places, such as the branch of a tree, for instance.

It has happened that, for some reason certainly connected with superstitious feeling, on our return ten days later, these handkerchiefs had not been removed. As a rule, the natives treated us well. At one place only had we a slight engagement. As we drew near, the natives had fled. As night was falling fast we were obliged to stop there. I went alongside and sent a native from the Equator with various presents as messenger of peace. However, he preferred to enter one of the huts and feast on the supper he found already prepared. The

natives were not far off, and had seen this theft. They flocked round in masses, all armed; the most daring approached within 15 yards of our camp, and two assegais were thrown at the steamer, one of which, a barbed one, penetrated the side with such force that it was not possible to withdraw it. Fortunately my revolver was close at hand, and a few shots made our foes beat a hasty retreat, while our men pursued them and burned the village. I ordered all hands on board again, and, to prevent any surprise, we passed the night at anchor in mid-stream.

The extreme point attained on the Ngiri must be about level with Bangala. There a canoe accosted us with two Bangalas who had entered from the Congo by the channel of the Ibinga, a fact which confirms in an interesting manner the existence of a means of communication other than by the mouth of the river between the Congo and the Ubangi.

According to my instructions, my mission was now at an end, and I came back to Leopoldville to send off my report, leaving the interesting question of the Welle in the same state as Mr. Grenfell.

To resolve it in the direct way in which I had attempted it, I required very different means of carrying out my plans, such as the central Government alone could place at my disposal; I had therefore but to wait. I employed this enforced leisure in exploring the Lopori. In the meantime Stanley's expedition arrived at Leopoldville, and every single boat was placed at his disposal.

Following on a conversation I had with Mr. Stanley at Equatorville, I decided to try and push on to the Welle by going up the Itimbiri as far as the Lubi falls. Here I intended to establish a small base of operations, and from there go due north overland.

Although I still consider that this project is perfectly realisable, it failed on the present occasion owing to the scarcity of population, the bad quality of my provisions and stores, and the precarious character of the means of transport provisionally placed at my disposal. Yet once more had I to retrace my steps without having succeeded in my designs.

On arriving at Upoto an incident occurred which contributed largely to my final success. A Zanzibari called my attention to an enormous canoe on one of the banks. It was one of those canoes that Stanley has described in the account of his fight at the mouth of the Aruwimi, with a raised deck at the bow and stern, and made of tough wood. At Stanley Falls the natives use them for raising their traps in the falls themselves. It was really the canoe in which the Haussas who had left after the fight against the Arabs had come down. The Upoto people had captured men and boat, and I in my turn had no scruples in taking possession of the canoe, which I brought down to Leopoldville, and had thoroughly repaired.

Wishing to know once for all what really were the resources that the State could dispose of, I determined to go down to Boma. Two months and a half later, in November 1887, I found myself once more on the Mobangi at the Zongo Falls, in the crocodiles' creek, with renewed means of pursuing my way, i. e. a little steam-launch without any cabin, the large canoe we had captured and 220 yards of hemp cable, twenty-four natives enlisted at the Equator, who were to serve me as rowers, and provisions and trade goods in sufficient quantities.

Let me state, *en passant*, that the French had established a post on the left bank in 1° 55' N. at Buanza-Modzia. I have great pleasure in bearing witness to the perfect tact and urbanity of the commander, M. Ussac.

The little steam-launch *En Avant* was the first ever launched on Stanley Pool, went as far as Stanley Falls, explored Lake Leopold II. and Lake Mantumba with Stanley, the Sankuru under Wolff, and it was aboard her that Captain Hanssens explored the Mongalla and Itimburi rivers, and proved the existence of the Ubangi; and finally, it is owing to this little steamer that the Welle problem was at last solved. I am delighted to have this opportunity of proclaiming the noble services rendered by this little boat, belonging to the Congo State, and built in the Belgian works of Cockerill.

But to come back to Zongo. I noted with pleasure that, though still very strong, the current was much less so than in October 1886. There was a difference of level of about four feet. But still the *En Avant* was not capable of overcoming the obstacle. I determined to reconnoitre with the canoe; if possible to navigate higher up, I would take the steamer's wheels off and drag the hull along the left bank by means of my cable. During my absence my men were to clear a way with their hatchets between Crocodile Bay and the one above the rapids, which figures on the map under the name of En Avant Bay.

Accompanied by M. Lienart, I started off in the canoe, which we hauled up over the rocks, and having once left the rapids behind, we made for Lance Island with our paddles. Here we encountered another rapid, which we once more surmounted, thanks to our cable, and then as far as the eye could reach not an obstacle barred the river, only here and there the point of some crag stuck up out of the water. During four days I pushed vigorously on, which means that I covered a distance of about 16 miles, which brought me to the Bonga rapids. This obstacle was formed by a sunken line of rocks, barring the river from one bank to the other. It was here that six weeks later M. Dolisie, on the French steamer *Asima*, struck, and was forced to retrace his steps. However, I finally discovered by the left bank a passage which the *En Avant* could get through when the water rose, for I found that the highest rocks were five feet below water and the current comparatively weak.

Returning to Zongo, we commenced at once the necessary work to

get the steamer up. The road between the two bays was ready for the transport of the wheels, paddle-boxes, and provisions. The steamer was taken to pieces, and by the aid of the cable was dragged from one bay into the other. It was really very easy work, only requiring an hour and a quarter. Frantic hurrahs from my men greeted this first success; they were not to be the last they would have an opportunity of giving vent to, and I saw with delight that every one was full of hope.

The *En Avant* was once more put together, and the cargo taken over entirely by the canoe to Lance Island, so as to lighten the little steamer, whose wheels, no longer dipping so deeply, acquired a greater velocity. Notwithstanding this precaution, on reaching the island the *En Avant* could not steam up the rapids, and had to be hauled up with the help of a rope thrown from the deck and seized by a black who resolutely jumped into the river. Thanks to this timely aid, we were enabled to reach a sandbank in the calm water beyond. The usual cargoes were apportioned as before, and we pushed on. As I had foreseen, the Bonga rapids were surmounted by keeping to the left bank, the canoe was unfastened, and came up by force of paddles and a little help from overhanging branches. A mile higher up the river was confined to a breadth of 440 yards, but the current was not very strong: it is true that we found a depth of nine fathoms. A little further on the river spread out once more to a width of 2200 yards, but was now sprinkled with islands and rocks, between which the water whirled and rushed. An examination in the canoe showed us a pass the steamer could get through without being taken to pieces, but merely unloaded. We carried the cargo across land to beyond the obstacle.

We were completely ignorant of the language of the natives, who were of but little use as far as information is concerned. When at Belly they seemed to tell us that higher up the people had very long hair. At the time I thought I had misunderstood them, this fact seeming so very extraordinary. We passed through another rapid, and then we came upon such a medley of rocks, rapids, islands, and waterfalls, that it was nearly impossible to make out anything at first. I established my camp a little below them on a sandbank under the right bank, and set off to reconnoitre in the canoe.

Once for all, let me state that no obstacle can stop this sort of embarkation, for it is always possible to tow along the river bank or haul along on land, and thus I had the most perfect confidence in my journey forwards with or without the steamer. This obstacle has a S.W. to N.E. direction, is formed by a group of islands and an isolated island joined to each other and to either bank by a line of rocks which cause various waterfalls and two rapids of the most violent nature. Altogether this is for a steamer the most serious obstacle I have come across. To get over it with the canoe even, seemed at first an impossibility, but a more exhaustive examination of the right bank showed me,

though the water was bubbling up, a narrow passage of from 8 to 10 feet broad. The current is very powerful, but shows that there is a gap in the rocky wall. Firmly securing the canoe to the bank, I took soundings, which gave me a depth of three feet. The pass is practicable! As the waters were sinking, I hurried on our preparations as before; the steamer was taken to pieces, and, by the help of the cable, hauled across the rocks. It was very hard work, and its successful accomplishment was greeted by three times three.

As we then fondly imagined, no further obstacle could stop us on our onward way. We gave the name of Elephant Island and Falls to this obstruction, as, during my reconnaissance in the canoe, we came across a superb elephant whose habitat was doubtless the group of islands. Assisted by my men I gave chase, killed, and cut him up. One quarter of the flesh was smoke-dried, and lasted the men for a month, the natives carried off the rest. The tusks weighed 42 pounds each.

We continued onwards, and up to Mokuangaz found it extremely difficult work, rocks and islands emerging on every side. I could only proceed in the steamer after having carefully examined the way in the canoe, so that our progress was slow, the journey from Zongo to Mokuangaz taking twenty days, though the distance which separates them is but 20 miles. The appearance of the country between these two points is beautiful in the extreme. On both sides rise gently sloping hills, woods, and pasture lands; fields of maize and bananas pass in endless succession. The villages are not as a rule built on the banks, but on the side of the hill; from afar the rectangular houses look like chalets; with some herds of fine cattle in the pastures, the illusion is complete. Everywhere the natives greeted us with loud cries of friendship, rubbing their arms one against the other; their cry of *nzen, nzen, nze*, reminded me of the Sennené of the Upper Congo.

As far as and including Belly, the natives have the same type as below Zongo, but they are less tall; their heads are shaved, except at the nape of the neck, and their moustaches are brushed up so that, altogether, they are rather like old soldiers. No tattooing on the face; some few pierce their nostrils and wear a small iron ring. They have but few ornaments, so our trade goods achieve a great success, especially our wire, which is instantly transformed into bracelets. These people treated us very kindly, and sold us plenty of provisions; they are neither noisy nor troublesome nor thieving. The villages by the water's edge are palisaded in front, and in the enormous cotton-trees beside them one can see one, two, and sometimes three posts of observation. These are very clumsily made, and as for *aérien* villages, they are a complete myth.

Above Belly, i.e. after the third rapid, a new tribe begins, the Ba-Kombe, or Ba-Nyombe. I could not see that they were in any way

tattooed; on the other hand, the traveller is at once struck by their head-dress. Although of different kinds, they have all a tendency to lean backwards, some ending in chignons, others very similar to those of the Monbutus, others, again, hanging down in long and slender curling tresses finally united in one. I measured some of these tresses more than six feet long. Some of the women rolled these tresses round their heads like turbans, the end hanging elegantly over one shoulder; ivory pins kept these head-dresses in place, and a ring of red copper passed through the upper lip completes the picture, which is far from being disagreeable. Some of these women are entirely naked, and others wear a few banana leaves, as I likewise observed amongst the Ba-Sokos on the Aruwimi.

Another peculiarity distinguishes the tribe of the Ba-Kombe. They understood the language of one of my men, a native of Upoto, and I was thus able to make myself understood as far as the rapids of Cetema, for during the whole of this distance we always met with Ba-Kombes in the riverside villages, where they served us as interpreters. I conclude from this that the Ba-Kombe must spread far inland.

Many of these natives pierce their upper lips and wear a double stud, one branch of which is turned up at right angles. This ornament is made of a white metal, which analysis has subsequently proved to be tin. I saw this metal as far as Mosso-Niellay. The natives pretend that this metal is extracted in the regions in the interior.

From Mokuangaz the river opens out before us, flowing straight from the north-east, and the outlook is superb. Free from all obstacle, from 900 to 1000 yards wide, the river flows with a depth of $2\frac{1}{2}$ fathoms between banks 6 to 10 feet high, where grassy plains alternate with clusters of trees. We keep on in this north-easterly direction for 30 miles, when the river flows straight from the east, a direction which remains the same on to the end of our voyage, i. e. a distance of 171 miles. We successively came in contact with the different tribes of Ba-Kangi, Mon-Ba-ati, Banzu, Mom-Bongo, and Yakoma on the left bank, and on the right the Bourakas and the Madurus. The natives never vary in their statement that there are no tributaries. As far as the Banzis the river goes under the name of Dua, from there it becomes the Koyu.

Sometimes the banks seem at first sight to be uninhabited, because the villages lie about a hundred yards inland, but the moment one accosts a passing canoe the inhabitants flock down to the water's edge. I never saw such a quantity of provisions everywhere, not only in one particular spot, but during the whole voyage: bananas, maize flour, sorghum, sweet potatoes, yams, beans, sugar-cane, sesame, ripe bananas preserved in honey, palm-wine infused with cola-nuts, tobacco, sheep, goats, splendid fowls, were offered us in abundance.

To sum up, it is the most densely populated and fertile land I have come across in Africa. From Mosso-Niellay the houses are built in a

shape closely resembling our haystacks. As a rule, the natives shave their heads in the shape of a triangle, the base of which would be the forehead. Amongst the Banzis and Yakomas there is on either edge of this triangle a flat band, formed of little plaits, on which are strung beads, generally white ones, but some are blue and others of red copper of native manufacture. At the back of the head the hair is braided in small curls, also strung with beads. The men wear the short petticoat, the stuff of which is made from the bark of a tree. Some of the women are nude; others wear between the legs a piece of dried banana leaf. One of the ends of this garment is brought flat on to the pit of the stomach, where it is kept by a cord which encircles the waist; the other end floats behind like a little flag. These people neither remove their hair nor practise circumcision, though they know the practice. The Banzis and the Yakomas work very well in ivory; the bracelets seem to have been made on the lathe; the pins, 11 inches long, are well carved and well designed.

On arriving at the Banzis we found the river narrowed by two rocky points jutting out from the sides and forming a rapid that the *En Avant* was powerless to overcome. I made several attempts, rendered useless for want of ropes, and in one of which I lost my anchor, broken off at the shaft—a very serious loss, as it forced me to camp on shore at night. At last I called upon the natives, who very readily sold me ropes, which enabled me to lengthen our cable, and finally haul up the steamer.

The natives took the greatest interest in our proceedings, pointing out the sunken rocks, taking up their fishing tackle which might have interfered with our manœuvres, and even gave us advice—the honest fellows. The medicine men made invocations in our favour, and, without being asked, they all gave us material assistance by helping our men to haul on the cable. The little steamer was thus got through the rapids and brought to higher up, where it was greeted by the enthusiastic shouts of the whole population, who, dancing and jumping, came to shake hands with all the white men. (This custom, let me state, exists amongst them.) I, of course, made an ample distribution of wire and beads.

The Banzi people robbed us in the most barefaced manner, but I have forgiven them in consideration of the spontaneous and efficacious aid they gave us on this occasion.

We had been warned by the natives that we would still meet with “moubays,” or rocks, higher up, and so in fact we did at Cetema, but the rapids they created were easily passed.

On the 30th December we discovered on the right bank the first tributary we had come across since leaving Zongo. Its mouth must be situated in about $21^{\circ} 30'$ E. longitude; it was blocked up by rocks. The natives were very suspicious; however they told me that the river

came from or was called Bangasso, the other arm on which we are sailing is called the Koyu. It was impossible to get any further information, as they warned us to go away. With regard to this river there is a remarkable coincidence which I have but lately been aware of. Dr. Junker identifies the river with the Mbomu, and gives the name of Bangasso as that of the chief of a riverside tribe not far from the mouth.

On the 31st December we were still steaming forward. There was not a rock to be seen; but, on the other hand, the sandbanks were numerous, the waters were falling rapidly, and the natives on both sides were thoroughly hostile. They made fun of us when we were stopped by a sandbank, and even threw earth at us; seeing our peaceful attitude they grew bolder and came down on us in canoes, their spears ready poised. A few shots, happily, put an end to these warlike movements. Having lost my anchor, I bivouacked at night on an island, which luckily happened to be uninhabited.

On the 1st January, 1888, we pursued our onward course. I saw in the distance a mountain, which warned us of rocks ahead. It so happened that the sandbanks had driven me to the right bank. I decided to continue on, as long islands—some deserted, some inhabited—separated us from the left bank. A large number of canoes accompanied us, and the natives were most provoking. We shortly came upon a rocky line where the water bubbled and whirled. The natives gave us to understand that we should require wings to get over it. On account of their hostile bearing I was unable to look out for a passage, and determined to retrace my steps, so as to cross over to the left bank and continue up on that side. The right bank was swarming with natives fully armed and greeting us with derisive laughter. All of a sudden a violent shock was felt, followed by a second slighter one; a big leak had been sprung in the steamer's bows. We at once transported our goods into the canoe, which I placed under the command of M. Lienart, giving him orders to run ashore on the right bank about 60 yards distant, so as to discharge his cargo, peacefully, if possible; if not, by force. Five men began to bail out the steamer, but the water came in rapidly; at last we discovered the leak—a hole four feet long by six inches broad; we plugged it with rags and planks. In the meantime I saw M. Lienart "exchanging blood" with the chief. The water gradually diminished in the steamer, whose stern was on a rock; after half an hour's labour we got her off, and I steered for an island about a third of a mile off, where I intended to beach her.

During all this time the natives in the canoes had not ceased annoying us. Notwithstanding their protestations of friendship, they inspired me with but small confidence, and, in any case, I had ordered a chest of cartridges to be opened. My fears were but too well founded; I had hardly reached the island when I heard shots from the bank. This is what had taken place.

The natives had made a pretence of receiving us as friends, the more easily to murder us and steal our goods the moment they thought they had a good opportunity; they fell on M. Lienart and his men with their lances. Two of our men were killed, one falling dead on the spot. M. Lienart at once gave the order to fire; three natives were killed, the others fled. The lieutenant then burnt some of their houses, reloaded the canoe and another he had captured, and rejoined me. The same day I returned to the village, found it deserted, carried off their goats, and completed its destruction by fire.

On the 2nd January, the steamer was dragged ashore, and we had before us four days' work in the midst of a hostile population. If they should attack us in any great number at night, or even in the day, we might have been annihilated. I decided to terrify them so as to gain time: I set fire to the villages on the right bank for a distance of three miles on the 2nd and 3rd of January, and the 4th passed off calmly.

On the 5th January, towards 12 o'clock, the *En Arant* had nearly completed her repairs, there being only a blade missing off one of her wheels. I had made up my mind to float her off and start next day, so as to get round the island on which we were encamped and into the channel on the left bank, and so on further. At about 1 o'clock we saw a fleet of about sixty canoes, each holding on the average twenty warriors, bearing down on us. There could be no doubt about their intentions. At the same instant a look-out placed in a high tree gave warning of the approach of a troop of armed natives, sheltering behind their shields as they advanced on us. These latter had reached the island from the left shore. A regular battle could not be avoided. Part of my men launched the *En Arant*, and I ordered the engine fires to be instantly lighted, and accompanied by M. Lienart and the rest of my men, I advanced on the natives who were on the island, and who bore courageously on, and only withdrew when five or six of them were killed. Hardly had I thus repulsed one attack when a second took place, coming from the upper end of the island. Just at this moment the *En Arant* was afloat, so I ordered M. Lienart to protect her against the probable attack of the canoes, while I myself advanced on the troop coming down the island. Notwithstanding heavy losses, these natives pressed on through the high grass till within 15 yards of the steamer; they were then almost on the muzzles of our guns. At last they retreated. A sandbank stretched out from the island a little higher up than our encampment, and on this spit the canoes disembarked 100 men or so. As in the preceding attacks, these brave fellows bore down on our very guns, and only retreated slowly when 10 of their number had been killed. A fourth attack then followed from the lower end of the island; it was not, however, so determined as the others, and we speedily repulsed it, killing two men, the others taking to their heels. But the battle was not yet ended. All the canoes gathered

together up river, drums were beaten, and they prepared to dart down on us.

Fortunately by this time there was sufficient steam up to enable us to work down stream (it was then half-past three o'clock), so I retreated, abandoning the battle field. Instead of pursuing us, the canoes went to pick up their dead.

This I consider as one of the hardest fights I have had in Africa. As a rule, the natives fly when they hear the first shots, especially if they see any of their men fall. But in this case it was quite different, the Yakomas came right up to our guns to throw their spears. If any one of their attacks had broken our line we should have been lost, for the boldest of their second line would have been on us at once. The four attacks they made to surround us were, fortunately, made one after the other; had they been made together we never could have repulsed them. A most remarkable fact was that during the whole of this fight, which lasted nearly three hours, the Yakomas never uttered a single cry; their death-like silence and their cold-blooded determination were enough to strike one with terror.

My little troop, composed of 12 Zanzibaris, five Haussas, a Kaffir, and a boy, behaved with a courage beyond all praise. The 20 natives from the Equator station, on the contrary, took refuge from the very first in the big canoe, where most of them gave way to despair, crying "We are lost."

As we started, the natives on the banks shot their arrows after us, whilst others, brandishing spears and shields, yelled insults at us. It was Pandemonium let loose.

We steamed down very slowly, for fear of striking on a sandbank, or, worse still, on a sunken rock; thanks to the chart I had made as we came up, we were able to keep on all night till four o'clock next morning.

I have often asked myself what could have been the cause of the hostility shown us by the natives, especially from the Bagasso (Mbomo) upward. They are passionately fond of beads, and I gave them beads in quantities. We were most conciliatory the whole time until they killed our two men. I can only think of one possible reason: they must have taken us for Soudanese.

I had decided to push on my exploration as far as the falls of the Kissangi, but the hostility of the Yakomas made this an impossibility. The river was low; we should have had to look for a passage between the sandbanks and rocks, and perhaps had some work to do on shore, and that in the midst of tribes who were hunting us down. I had only twenty men on whose courage I could count, and but 600 cartridges. There was nothing for it but to retreat.

I will pass briefly over the difficulties that lay in the way of our downward course. The river had sunk six feet or more, and was a

totally different one to that which we had steamed up. We were only going half-speed, and often with just enough steam on to steer, and the canoe constantly ahead taking soundings. Notwithstanding these precautions, we ran aground a dozen times, but thanks to the thickness of the hull of the *En Avant*, and the slow rate at which we were going, no serious accident occurred.

On the 13th February I reached Leopoldville once more, and there I learnt the death of Captain Vandeveld. The Governor-General begged me to take over the vacant commandship, and proceed to the Stanley Falls with the Captain's expedition. I executed these orders, and then returned to Europe.

Before I finish, let me show my appreciation of the services rendered me by my companions in my exploration by recalling their names: Lieutenant Lienart and Messrs. Schomberg and Hansen.

The foregoing paper was read in the absence of the author by Colonel Sir FRANCIS DE WINTON, who prefaced the reading by explaining that it contained an account of the journey of an officer of the Belgian Army, who had been employed by the Congo Free State. Captain Vangele's explorations had a special value, as they proved that the Welle and the Ubangi were one and the same river. The author of the paper could not be present to read it, because on the 4th of this month he started on his return to the Congo. The journey of which an account was given in the paper was over a very difficult series of navigations, and was undertaken with a very small force and only one small paddle-wheel steamer and a canoe. After Grenfell's journey in 1885 geographers were met with this problem, whether the great riverine system which Schweinfurth discovered in the Central Soudan was the same as that which Grenfell had traced to 4° N. Captain Vangele's journey had solved the problem, and proved that the Welle and the Mobangi were one and the same river.

After the paper,—

Mr. RAVENSTEIN said that it was a great pleasure to learn that some good work had been done by the employés of the Congo Free State. A great deal had at different times been said about the connection of the Mobangi and the Welle, but Captain Vangele's explorations had settled the question. When Grenfell first reached the great bend of the river he naturally jumped to the conclusion that it was the Welle of Schweinfurth, and the Belgian officer had practically proved that that was so, the distance between the two points visited respectively by Dr. Junker and Captain Vangele being only 60 or 70 miles. Schweinfurth described the region as extremely fertile, and stated that slave-traders from the Soudan met there, and one of the itineraries obtained by Dr. Barth described the same region as a very paradise of slave-dealers. The district was not at present very accessible, but with modern means of locomotion it would soon be easy to get there. Captain Vangele suggested that he was taken for a man-hunter who came from the north, but when a proper understanding was arrived at the natives would no doubt become friendly. If the Congo Free State exhibited a little more liberality in equipping their expeditions better work would be done. Lieutenant Coquilhat, one of the most intelligent of their explorers, who attended the British Association at Manchester, had on his journeys in Central Africa no barometers or thermometers, and could only record, by means of his watch, how many hours of rain there were each day.

LATEST NEWS OF STANLEY.

In answer to a question on this subject by Sir George Bowen,

Sir FRANCIS DE WINTON stated that he would be very happy indeed to give some information as to what the Emin Relief Committee were doing, as well as the latest news of Stanley. They had never kept anything back from the public, but they had always endeavoured to confine themselves to actual facts, and to avoid countenancing any sensational rumours. Many rumours had been circulated about Stanley. He had been assassinated three or four times; but this the Committee did know, that he was at Urenia on the 17th August last, near to the spot where Major Barttelot was murdered. From there he sent a messenger down to Stanley Falls to Tippu Tib to announce his arrival, and to state that he would remain there for ten days, after which he would return to Wadelai. He asked Tippu Tib to accompany him, and said that the road was easy, that plenty of food could be obtained, and that Emin Pasha had large stores of ivory. A second messenger arrived at Stanley Falls with four letters from Stanley, but those had unfortunately been detained by the Belgian officials at Stanley Falls, and were expected to arrive home in about three weeks from the present time. In those letters it was hoped full intelligence would be given of what Mr. Stanley intended doing as regards his return journey. He did not think that the statements in the public press as to Lieutenant Baert's report had a shadow of foundation. Stanley had neither the men nor the money to go to Khartoum, and he (Sir Francis) had written to the Administrator of the Free State at Brussels, asking on what grounds Lieutenant Baert had made such statements, and stating that the Emin Relief Committee could only infer that Lieutenant Baert must have opened the letters that were sent down to Stanley Falls. What was known was that Stanley was going to leave on the 28th August, and that would take him back to Wadelai about November 17th. Then he would decide for himself whether he would come down by Unyoro to Lake Tanganyika or not. A large dépôt with provisions and about twenty donkeys had been formed for him near the south shore of Victoria Nyanza, at his own request; but hearing of the troubles in Uganda, he might work his way to the eastward, and come out on the east side of Victoria Nyanza, following the track of Mr. Thomson to Mombasa. Probably he was now on his way down to the east coast, but the letters which it was hoped would be received in a fortnight or three weeks, would settle that point. At the same time, the Congo officials ought to have sent the letters down at the first opportunity, because a month might have been lost in sending relief to Stanley on his return journey.

A vote of thanks to Captain Vangele and Sir Francis De Winton concluded the meeting.

The Congo, and the Ngala and Aruwimi Tributaries.

By J. R. WERNER.

(Read at the Evening Meeting, May 13th, 1889.)

Map, p. 404.

IN April 1886, I was engaged by the Congo Free State to go out to Boma on the Lower Congo, and on arriving at that place, was despatched up country to a station called Bangala, which was to be my headquarters, and where I arrived about the middle of August.

Bangala station is on the north bank of the Congo, some 500 miles above Stanley Pool. It is situated in the village of Iboko, which is just about the centre of a ten-mile line of towns and villages inhabited by the tribes of the Ba-Ngala. This settlement is surrounded on three sides by swamps, and on the fourth the river Congo cuts off all communication except by boat. According to native accounts it is possible in the dry season to go some two days' journey inland, and I should think it was quite possible to penetrate to the waters of the Ubangi, but as the tribes on the banks of that river are hostile to the Ba-Ngala, I had no means of ascertaining, and I have never been more than six or seven hours' march in that direction myself. I found the country low and gently undulating, the higher ground being for the most part cleared and cultivated, the hollows being filled with a dense scrub, which, in the wet season grew out of three or four, sometimes more feet of water. After some three hours' journey inland, all cultivation ceases, and the road runs through one continuous jungle of scrub, there being very few large trees.

When I first arrived at Bangala, the officers in that station had a theory that the Ubangi emptied itself into the Congo by several mouths, one of which was thought to be the Ngala or Mongala river; but from the descriptions I have heard of the Ubangi river, it appears evident that it could not make use of the Ngala as an outlet. I will presently describe the exploration of the Ngala by Mr. Baert and myself, but before doing so will give my reason for thinking that instead of the Ubangi supplying water to the Ngala, both the Ngala and the Congo pass some of their water for the greater part of the year into the Ubangi, this water of course returning to the Congo at the mouth of the Ubangi.

In passing up and down between Bangala station and Moboka, a place a few miles up the Ngala river, I noticed several channels of from 50 to 100 yards wide, into which the water of the main river seems to flow. These channels are reported by natives to lead into the Ngiri river, a small tributary of the Ubangi, which was explored by Captain Vangele, and reported by him to flow east to west. Captain Vangele traced its course till he was about the longitude of Bangala station, where he was obliged to turn back on account of the stream being choked with weeds and grass. In December 1887, I noticed, after a sudden fall in the waters of the Congo, that the water from these channels ran into and not out of the main river, from which I concluded, supposing these channels to be connected with the Ngiri river, that the waters of the Ubangi were not falling as fast as those of the Congo, and that the latter river was therefore receiving some of the water of the Ngiri which usually went to the Ubangi. A few miles up the Ngala river there was also a channel reported by natives to flow into the Ngiri river.

In October 1886, Captain Coquilhat, who had intended exploring the

Ngala river, being obliged through ill-health to return to Europe, left instructions to his successor, Lieutenant Baert, to carry out his plans. Accordingly, on November 22nd, Mr. Baert started in the steam-launch attached to the station. I accompanied him. As my journal of this trip has been lost, I can only give a very superficial account of it.

About the middle of the second day we entered the mouth of the Ngala, which for about five miles flows almost parallel with the Congo, its width being about 300 yards. After this it takes a bend towards the north, and just at this bend is a narrow channel some 60 to 70 yards wide and about half a mile long, connecting with the Congo; the water in this channel flows out of the latter river into the Ngala. Towards evening we arrived at Ngombe, a village of the Wabika, whose great town Mobeka was a few miles higher up. Up to this point the banks of the river were low and swampy, and here were very little better, the villages being barely above high-water level.

Here we camped for the night, the natives being very friendly, and bringing large tusks of ivory to sell. Next morning we proceeded to Mobeka, from whose chief, Lusengi, Mr. Baert hoped to obtain a guide to accompany us. In this, however, he was disappointed, as Lusengi wanted to retain the monopoly of the ivory trade on that river, and appeared to imagine that our only object in going up was to buy ivory; he demanded an exorbitant price for several tusks which he produced, and made out a long list of evils that would befall us if we went up the river without his permission. The text of all his arguments was, "Buy my ivory, return home, get more money, and come back to me to buy more." Next day, failing to obtain a guide, we left Mobeka, and for two days more steamed between low, swampy, forest-covered banks, having a great deal of trouble every evening to find dead wood for fuel, or a piece of ground dry enough for a camp. About November 26th we arrived at two villages, called Mankula and Iboké; these villages were very miserable-looking places, situated on ground that was only two or three feet above the water, and exceeding in dirtiness all the villages I had previously visited. That we had entered a new country was evident, for the natives had their faces cut and cicatrised in a way that reminded me of the Basokos of the Aruwimi river; in fact, we afterwards had Basoko given us as the name of the tribes on the left bank, while those on the right were called Akulas. This rule did not always hold good, for now and then we would come across a village of Akulas on the left bank, and *vice versa*.

After leaving here we continued between the same swampy forest-covered banks till evening, when we camped on the only piece of dry land we had seen all day. Next day we passed a village called Mpeza, built on piles, the water at this season of the year having overflowed the river banks to a depth of several feet. The place reminded me very much of the pictures I had seen of villages on Lake Mohrya, as described

by Commander Cameron. The natives here having never seen a steamer or a white man before, all ran away, so we could get no information from them beyond the name of the village.

On the 28th we saw some low hills on the right bank, and came upon a village called Mputu, where Dua (a native of Bangala who acted as interpreter) managed, after a long palaver, to obtain permission for us to land, but this was of little use, as far as buying food was concerned, for the natives were too frightened to sell much to our men. The chief, a very old man, presented Mr. Baert with a bunch of bananas, two or three fowls, and a wretched-looking native dog. The latter was declined in spite of Dua's request that it should be delivered over to him to furnish a meal for the several Ba-Ngalas who were with us. This village looked as dirty and miserable as Mankula, and the people were evidently cannibals, for I came across a dead tree in the centre of a small open space, round the trunk of which was a seat formed of pieces of old canoes supported on human skulls, while its leafless branches were adorned with many more. Salt-making appeared to be the chief occupation of the natives of this village.

After leaving this place the banks become higher and the river assumed a north-easterly (general) course, finally turning round to north by west, and then back again to north-east. There were numerous villages on both banks, but the natives all ran away as soon as they caught sight of the steamer, many of them who were in canoes jumping into the water and leaving their canoes to drift away down-stream while they swam ashore. Some of them must have deserted their canoes at the mere sound of the steam from the exhaust pipe, for on rounding bends of the stream we several times nearly ran down empty canoes, of whose owners we could not see a sign. Dua standing on the sun-deck and shouting into space could only manage to get a short reply from an invisible native, hidden in the bush, to the effect that we were bad spirits and were to go away.

As we persisted in continuing our course we were presently assailed with arrows made of reeds with hardwood points, but most of these fell short and no one was hit.

The stream was here about 150 yards wide, and nearly all the villages stood a little way back from the river; and the architecture of the huts was different to that of the lower villages, the huts being all of the circular form with conical roofs.

On November 30th we passed two or three small tributaries on the left bank about 70 or 80 yards wide, and the river itself rapidly narrowed till towards evening it was barely 60 yards wide and ran at the bottom of a valley between two ridges of low hills. Next day these hills gave way to bluffs, and we got through the first rapid, coming shortly afterwards to a tributary about 50 yards wide entering on the right bank, the river being now reduced to the same width. Shortly

afterwards it narrowed down to about 30 yards, and we had to make our way through a succession of rapids (where there was only from four to five feet of water over the rocks), and round several sharp curves till we entered a gorge between two vertical bluffs from 30 to 40 feet high, through which the river rushed at such a rate that our little steamer could only just make headway against it. Rounding a very sharp bend we came upon a village on the top of the left-hand bluff, the natives of which did not run away, but stood looking down at us; as the river was here reduced to some 20 yards in width, we could see nothing of the village beyond a few banana plants.

In answer to Dua's enquiries they gave the name of their tribe as Saibi (or Sebis), and we drew alongside the bank to try and obtain further information and induce them to sell food to our men, who were getting pretty short. Taking advantage of the stop I was proceeding to examine the engine when a crash on the sun-deck, followed by the sharp report of a revolver, made me jump for the wheel, and in a few seconds we were tearing at full speed, regardless of rocks and snags, down the rapids, to avoid a shower of stones and arrows from the angry natives, one of whom had, for some unknown reason, thrown a lump of wood at Mr. Baert who had replied with his revolver.

There was now nothing for it but to turn back, as the natives were all up in arms, and the war drums boomed on all sides, arousing the tribes below, who, having got over their fear of bad spirits, now lined the banks in front of their villages and showered arrows at us in such numbers that we were several times compelled to use our rifles to drive the natives back, for fear any of our men should get struck with the arrows, which we concluded were poisoned, from the fact of their being nothing more than light reeds with only a hardwood point.

On December 5th we arrived back at Bangala station. Mr. Baert having worked out several observations which he had taken, fixed the farthest point reached by us as about 3° N., and somewhere between 20° and 21° E. A straight line drawn from Upoto on the Congo, and Zongo on the Ubangi, would thus just about cross the source of the Ngala river, where the ground is hilly. I therefore conclude that the hills which approach the Congo at Upoto extend right across to the rapids of Zongo. Between the mouth of the Ngala river and Upoto the banks of the Congo on both sides are low and swampy, and continue so after we have passed the few miles of high ground on which Upoto and the neighbouring villages stand, till we approach the mouth of the Aruwimi, after which the banks gradually rise in height.

From the enormous quantity of ivory I have seen at Upoto, I should think the natives must have communication with tribes far back inland, and that this would be a good situation for a trading station.

During the time I was in Africa I had steamed frequently up and down both banks of the Congo between Bangala and Upoto, partly on

trading expeditions in search of ivory, and partly to try and ransom the Haussas who had been captured by the people of Upoto as they were trying to reach Bangala after the loss of Stanley Falls station in August 1886. I was heartily sick of the monotonous low-forested banks, with no view beyond the two dark walls of forest stretching away before and behind, and it was a great relief to me when, on April 8th, 1889, Mr. Ward appeared at Bangala in a canoe, and Mr. Van Kerckhoven, who was then chief of that district, determined to take back his men to Major Barttelot at Yambuya. Accordingly, on May 6th, I found myself entering the Aruwimi.

From Stanley's description of this river I had expected to find plenty of water everywhere, and was rather surprised at the number of sand-reefs and the difficulty I had in finding a channel deep enough for our steam-launch, which drew three feet six inches aft. After passing the town of Mokulu, the whole character of the country seemed to change, the islands stood higher out of the water and were covered with forest, which crowded with palmas, the crowns of which looked very pretty above the trees. The high banks on either side were lined with villages or rather the sites of former villages, for the Arabs had been raiding here, and the natives were now living under roughly put-up sheds of leaves and sticks; the conical huts described by Stanley had almost entirely disappeared, and during the time I was on this river I only saw six, four of which were inside Major Barttelot's camp at Yambuya, and the other two in the village of Irungu. Now and then we passed large clearings, where it was evident villages had lately stood, as there were still plenty of banana plants showing above the long grass.

About midday on May 7th we came in sight of the high bluff on which Stanley had found the large town of Yambumba; there was now not a single hut on the vast clearing where the town had been, while on the opposite bank of the river such of the natives as had not been killed or carried into slavery, were living under sheds and awnings of sticks and palm-leaves; the only weather-proof huts in the place being those occupied by two or three Arabs and their Manyema followers. On this side of the river the bank was quite low, and offered a strange contrast to the precipitous bluff on which the town had formerly stood.

Above Yambumba the Aruwimi runs between two ridges of low hills, which are covered with magnificent timber. There are no more villages on its banks until Yambuya is reached, though, according to what the Arabs say, there must be several a few miles further inland on the left bank.

Up to Yambumba the country was more thickly populated than any part of the Congo State I had previously seen, but the natives are fast disappearing, and taking to that nomadic kind of life which the inhabitants of the regions below Stanley Falls resorted to on the advent of the Arab slave-raiders.

I once remarked to Mr. Jameson that, although the natives in places appeared to have submitted to the Arabs and were living at peace with them, they did not attempt to rebuild their villages, but lived in canoes and rough shelters of sticks and leaves, and did not settle down anywhere. He replied that he believed the Arabs would not let them rebuild their huts, and that he had noticed the same thing at Kassongo.

Major Barttelot, who was present, said that as soon as any natives attempted to build permanent huts the Arabs pulled them down. He further stated his belief that this was done by the orders of Tippu Tip, in order that the natives might be available at any time to take part in raids against neighbouring tribes; he did not, however, tell me where he had heard this.

On May 8th, at about 10 a.m., we came in sight of the rapids and the stockade of Major Barttelot's camp, and shortly afterwards had the pleasure of meeting the Major and Mr. Bonny in pretty good health. On going up into the camp, however, I discovered Mr. Troup on his back, unable to move, having severely strained himself on his march over from Yangambi on the Congo. Mr. Jameson was away to Kassongo after Tippu Tip.

The Aruwimi tribes, judging from specimens of their workmanship I have seen, must be very clever blacksmiths. In everything they did there appeared to me to be a higher state of mental development than in any of the tribes I had hitherto met. Their conical huts, of which four remained standing inside the palisade of the camp, were the best contrivances I have seen for keeping things dry in this damp climate. The bases (some of which were round, others square), formed of clay, supported by sticks driven into the ground all round, were from 18 inches to two feet high. On the top of this was a conical roof formed of sticks tied together at the top, their bottom ends reaching well over the edge of the clay platform. As the roof sloped up at an angle of about 70° and was covered with a thick thatch of broad leaves, it formed as rain-proof a covering as any one could wish to be under. The doors were just large enough for a man to crawl through.

Yambuya must have been a town nearly as large as Yambumba, for the clearing where it had stood was over two miles long. Of the town itself nothing now remained but the four conical huts just described. On May 4th we left Yambuya to go to Stanley Falls, as Mr. Van Kerckhoven wanted to find out what had become of Tippu Tip. Next day we entered the Congo and turned up-stream. The banks of the river soon began to rise in height and the islands to thin out, giving splendid views of long reaches of river. Several sites on which villages had stood, when I went with Captain Coquilhat to the assistance of Mr. Deane in 1886, were now grass-covered wildernesses, and the natives appeared mysteriously from invisible creeks among the islands in canoes,

across the centre of which they had placed a kind of roof made of palm-leaves.

On May 14th we reached the mouth of the Lomami, which enters the Congo from the south, and found that Rashid, the man who had commanded the Arabs in their attack on Stanley Falls station in 1886, had established his headquarters just on the lower corner where the two rivers unite. About two miles below Rashid's establishment was a market-place, and on this market-place I have twice, the first time in September 1886, and again in May 1888, seen the biggest crowd of people it has ever been my lot to come across—an open space larger than Trafalgar Square crowded with natives; while along the shore lay hundreds of canoes of all sizes. I counted over 300 of the larger ones, and nearly all had a roof amidships.

Next day we crossed over to Yangambi and Yaruché on the north bank, and the day after were joined by Major Barttelot, who had walked over from Yambuya to Yangambi. We were very well received by the Arabs at all their stations between Lomami and the Falls, at which place we arrived on May 18th. There being no news of Tippu Tip or Mr. Jameson, we had to wait here some days, and I took the opportunity of examining the island on which the former station had stood.

The channel which divides this island from the right bank of the river struck me as being specially fitted for the construction of a canal through which steamers might gain access to the river above the Falls. This channel was nowhere more than 30 or 40 yards wide. The upper end was closed by a reef of rocks which, at this season of the year, was quite dry, and acted as a natural dam, which would hold back the water while a lock was constructed at the lower end of the channel. There are also some rocks across the lower entrance to the channel which would have to be blasted away, and a little dredging would be required to clear the entrance. When this was done the upper reef could easily be removed by blasting, and we should have a canal through which any boats that can navigate the river between Stanley Pool and Stanley Falls could pass with ease.

There are, however, six more cataracts above this. The lowest of these could, I believe, be surmounted by means of a canal in the same manner, and the other five are so close together that, according to Stanley, a nine-mile railway would pass them all.

On May 22nd, a great fusillade on the south bank made me aware that Tippu Tip had arrived, and in the evening I met Mr. Jameson, who gave me a very interesting description of his canoe journey to Kassongo. He had made a map of the Congo between Stanley Falls and Nyangwe, and had carefully noted soil, currents, and other particulars, as well as made many sketches on the way. It was his description of the sixth cataract that led me to infer that it would be easy to make a canal past it.

Next day, on going up to the house where Major Barttelot and Mr. Jameson were staying, I found Tippu Tip—the Bismarck of Central Africa as a Scotch lady very aptly termed him. To me personally he was always polite, but from the first moment of seeing him I felt a certain distrust of him, which I have never got over. One thing I noticed in particular, nothing escaped his quick restless eyes, and I was very much amused when, a few days later at Yambuya camp, he sent an interpreter to me with a request that I would come and see him, and found that all he wanted to know was the meaning of the numbers and designs on the brass buttons of two Belgian officers who were in uniform. He wanted to know which was chief, a question I could not answer, as I had not heard who had been appointed Commissaire de District of Stanley Falls; so I replied that I did not know, on which Tippu went through a description of the uniforms, and asked what rank each man held. I told him one was a captain and the other a lieutenant, and he at once put down the captain as chief.

On May 26th Major Barttelot and Mr. Jameson left the Falls, taking with them the four hundred men Tippu Tip had brought from Kassongo. They proceeded down to Yanganbi in canoes, and then marched to Yambuya. On the 30th we followed in the steam-launch, taking Tippu Tip and his principal men with us. As each of the Arabs had several gun-bearers, boys, and women, we were most uncomfortably crowded.

On June 2nd we entered the Aruwimi, and being heavily loaded, could not make much headway against the current, so failed to reach the first Arab settlement by night. Tippu and his men therefore drove the natives out of a small village on one of the islands and proceeded to make themselves comfortable in it. One of the men raking round after spoil came across a large pot, out of which he took the half-boiled head of a native, thus proving that the Aruwimi tribes are cannibals.

Next day (June 4th) we were caught up by the steamer *Stanley*, which had come up from Leopoldville with the officers and garrison for the new Falls Station. We arrived at Yambuya the same evening, and for the next three or four days I was very busy helping Mr. Jameson to reduce the weight of the loads. My disgust may be imagined when, after all had been done, I learnt that the men refused to carry them because some were one or two pounds over forty pounds, and that Tippu Tip supported the men. Mr. Jameson at once set to work to weigh all the loads and alter such as were over weight, and I would gladly have remained to help him, but I had to leave for Stanley Falls next day. Mr. Troup had in the meantime been put on board the *Stanley*, and on June 9th we left Yambuya.

On June 26th I left Stanley Falls for the last time, arriving at Bangala on July 3rd. A few days later I was seized with dysentery, and compelled to go to Equator station, where Mr. and Mrs. Banks did

everything they possibly could for me, and so far restored me to health that I was able to start for the coast at the end of August, and arrived safely in England at the end of November.

Further Explorations in the Caucasus.

(Papers read at the Evening Meeting, March 25th, 1889.)

Map, p. 404.

1. THE ASCENT OF KOSHTANTAU. By A. F. MUMMERY.

THOSE who have studied Mr. Freshfield's papers and map in the last volume of this Society's 'Proceedings' have, or ought to have grasped the fact that about midway between Kazbek and Elbruz the Caucasian chain towers up in two great parallel crests, containing within an area of about 16 square miles at least half a dozen peaks over 16,000 feet in height, an elevation reached nowhere else (with the, it would seem, doubtful exception of Ushba) by the summits of the crystalline crest. Two of these peaks were trigonometrically measured from a distance many years ago, and have been long counted as the second and third summits of the Caucasus—Koshtantau, 17,091 feet, and Dychtau, 16,924 feet; a third peak, known on the Suanetian side as Shkara, was asserted last year by Mr. Freshfield to be higher than either of the two just mentioned, and this assertion appears to be borne out by the observations of the mountaineers who followed me.

To further investigate this group, and, if possible, to climb Koshtantau and Shkara, were the main objects of my journey.

In the first week of July 1888, I rode from Pätigorsk, across the steppe to Naltahik, and thence over densely wooded limestone hills to the bleak and cheerless Bezingi Valley. Late in the afternoon of July 7th we reached the village of Tubenel. The flat roofs of the houses were crowded with picturesque groups of women and children, who appeared greatly amused by our appearance. On reaching the house of the Starchina, or headman, we were hospitably received, and a large room was promptly put at our disposal.

The next morning, with my Swiss guide, Zurfluh, and a native porter, I set out for the great glacier at the head of the valley, leaving my interpreter to follow with the heavy luggage. On reaching the ice we walked up it for three or four miles, and then struck its right moraine, and camped beside a small stream flowing from a great bed of winter snow. The moraine was extraordinarily brilliant with flowers, among which I recognised such old friends as primroses, pansies, ox-eye daisies, and several varieties of gentian, whilst the stony slopes above were bright with great clusters of white rhododendron blossoms.

The map will explain our position and the orography of the district.

Opposite and in front of us was the icy wall of the Caucasian watershed. We were at the western foot of the great parallel ridge which culminates in the summits of Koshtantau and Dychtau. And here I had better say once for all that I apply these names as they are applied in all the official maps at present issued. Local usage no doubt differs, but no geographer who desires to be intelligible will abandon the nomenclature of the Survey until it has been abandoned by the Survey itself.

As our luggage did not arrive, we spent a somewhat cold night, and were glad to turn out at daybreak to explore the western face of Koshtantau. In the then state of the mountain, however, we could find no line of ascent that did not involve undue danger from falling stones, so we determined to return to our camp and repeat our attack from the south. Unluckily, after camping high on the moraine of the Bezingi Glacier, Zurfluh proved to be too unwell to climb, and the attempt had to be postponed. As I did not care to lose a fine day I sent him back to our lower camp, and scrambled alone on to the great western buttress of the peak, itself some 13,500 feet high, and carefully examined the route we should have to follow. Late in the evening I rejoined Zurfluh, and found him quite recovered and eager to be at work.

During the next week we crossed on to the névé of the great Dychau Glacier flowing towards the Balkar valley by the gap at the western base of Shkara (on which my aneroid gave the height of 13,000), and made an attempt to climb Shkara from that side. The glaciers proved, however, too huge and too broken for such a small party as myself and my guide, and we were forced to turn back after reaching a height of about 15,000 feet. The repulse was the more provoking as there was no wind, a cloudless sky, and the atmosphere was exceptionally clear. Indeed, in the far south we could just see a white cone with a smaller cone to its left, and which, it seems, can have been none other than Ararat itself. We were much inclined to repeat our attack, it being suggested that the Tartar should be taken with us to make a third on the rope, but signs of approaching bad weather were not wanting, so we ultimately decided to return to the shelter of the tent, which we had left on the moraine of the Bezingi Glacier. To vary our route we left the Shkara Pass on our left, and crossed the great ridge connecting Shkara and Dychtau by a second and somewhat higher gap. We got to the shelter of our camp about two o'clock, just as a deluge of rain burst upon us. Notwithstanding the weather, the Tartar cheerfully set out for Bezingi to bring a fresh supply of food and other necessaries.

The rain continued ceaselessly till late the next afternoon, when a furious south-westerly gale drove the clouds down the valley, and the mountains reappeared, covered from top to bottom with new snow. As the great peaks were, in consequence, temporarily inaccessible, I determined to cross into Suanetia by the Zanner Pass. Our luggage was rather bulky, so I engaged a friendly shepherd to come with us. He



KOSHTANTAU, FROM THE SALANANCHERA GLACIER.

(From a photograph by H. WOOLLEY.)

did not, however, keep his engagement, and the next morning, after waiting till six o'clock, we had to redistribute the loads and start without him. We reached the pass in a dense mist, and, owing to our failure to realise that Caucasian glaciers usually flow parallel to the watershed, we crossed the trough of the glacier and were soon hopelessly at fault and reascending amongst a maze of great séracs. Luckily a momentary rift in the cloud sufficed to show that we were high on a spur of Gestola, and we succeeded after some difficulty in getting back into the trough of the Zanner Glacier, and ultimately on to the route followed by Mr. Freshfield. We crossed the chain at a point about a mile south of his pass. We shouldered our way through driving mist till, just as we were quitting the glacier, the mists rolled away and the setting sun lit up the delicate tracery of shrub and creeper-covered rock, of tree and fern, till even my guide was fain to admit that his native Alps had nothing equal to it. To an Alpine climber it is indeed surprising to stop off a great glacier like the Zanner and almost instantly to plunge into a dense forest of leafy trees knit together by a nearly impassable undergrowth of flowering shrubs.

Towards dusk we reached the open valley, and found it studded at intervals with towered villages. At more than one of these we halted for a bowl of milk and to ask the way to Mujal. About ten o'clock we reached the village, and proceeded to the Starchina's house. Our efforts to rouse the inmates were responded to by numerous dogs, and for a few minutes we had as much as we could do to keep them at bay. The babel of howls and barks more, perhaps, than the raps of our axes on his door, at length aroused the Starchina, and the dogs were sent yelping back to their kennels by a freer use of the stick than we had thought it politic to indulge in. The Starchina then addressed me at some length in Suanetian, and, as none of my party understood a word of that language, I replied at equal length in English, much to the amusement of the natives. By the aid of a few Russian words we made our wants known, and, headed by the steaming samovar and lit with flaring torches, we were led to the guest-house, a building some quarter of a mile distant. A fleet-footed native preceded us, and when we got there we found a blazing fire, and were promptly provided with tea, Russian bread, eggs, and unleavened cakes. As it was by now eleven o'clock, I explained, aided by my Tartar porter, that we would rather go to sleep than partake of the aldermanic banquet we were given to understand was in course of preparation, so with a courteous "Good night" from our host we were left to rest in peace. Our quarters were excellent, and long before the crackling fire had burnt itself out we were all sound asleep.

The next morning we spent an hour or two lounging in the balcony enjoying the glorious views and rich vegetation after the bleak and treeless slopes of Bezingi. Towards the afternoon we strolled up the

valley and through the gorge of the Thuber torrent to the glacier of that name. We pitched our camp amongst the last of the pines, in an exquisite little glade carpeted with ferns and intersected by countless streams. Our camp-fire burnt furiously, and more than once we had to set to work with our ice-axes to keep it within due bounds. Long into the night the red flames threw weird shadows into the darkness and lit up the handsome faces of the Suanetian and Tartar porters as they turned the long spits on which our evening meal was preparing.

The passage from Muijal to Chegem is usually made by the Thuber pass, though the natives know a second and somewhat longer pass called the Basil. Our intention was to cross this latter, and our Suanetian porter, before leaving, gave us much good advice as to the route we were to follow. Possibly because we could not quite understand what he said, or possibly because a certain member of our party has an ineradicable affection for short cuts, we found ourselves about ten o'clock the next morning on the top of a false pass, with the huge Gvalda Glacier, flowing back to Suanetia, at our feet, and a second low ridge, the true watershed, in front, over which it was quite obvious we must force our way if we wished to sup that night with the shepherds of the Basil-su.

The arrangement of this part of the chain is, from an Alpine point of view, very curious. There is a lofty ridge with occasional aiguilles from the southern slopes of which stretch the great ice-fields of the Thuber, and there is a second and rather less lofty ridge to the north and parallel to it, from the northern flank of which flow the Basil Glacier and its various affluents. In the narrow trough between these two ridges lies the head of the Gvalda Glacier. Though seldom so clearly marked as in this instance, the same system of short parallel ridges may be traced throughout the whole central group, with the result that the upper and middle basins of the great glaciers are nearly always parallel to the main ridges, and it is only when the drainage from these catchment basins reaches the head of the lateral valleys that the ice sweeps round and flows away at right angles from the watershed.

I am aware that I am here, to some extent, repeating what Mr. Freshfield has already told the members of this Society, but the Gvalda Glacier is such a peculiarly excellent example of this structure, and the facts are so important in their bearing on the theory of mountain sculpture, that I may perhaps be pardoned the repetition. The Gvalda Glacier is probably the most important on the south side of the Caucasus, and far exceeds in size any on the south slope of the Alps. Its basin exceeds in extent that of the Glacier du Géant, to which it is not without a resemblance.

A short descent brought us on to the highest névé of the Gvalda Glacier, and, turning to the east, we ascended the long and narrow snow

valley which forms its uppermost reservoir. The ridge on our left (which forms the watershed) was inferior both in height and massiveness to that on our right, and a little further it ceased abruptly, and the watershed was transferred to the southern ridge. On climbing the low wall of rock which connects these two ridges we were rewarded with the sight of the bleak slopes of the northern country. Though the view in front was poor, that looking back, down the great trench of the Gvalda, flanked by precipitous aiguilles, and closed at its further end by the huge peaks of Ushba, was more glorious than words can describe.

My men, Zurfluh and the Tartar, were, however, impatient to be off, and whilst I sat trying to take a mental photograph of the view, started downward. I rejoined them just as they were beginning the descent of a short but steep slope of snow-covered ice. An instant later the Tartar slipped out of the steps Zurfluh was cutting, and shot down towards the Bergschrund with terrible speed. Luckily he cleared the ice-ditch and landed in a confused heap on the level snow beyond without damage of any serious sort. On rejoining him we took out the rope (for the first time that day) to guard against any repetition of such performances. The Caucasian glaciers in this part of the chain are so much less crevassed than the Alpine that the rope is apt to fall somewhat into disuse. This comparative infrequency of crevasses is, apparently, due to the lesser inclination of the great glaciers, and possibly to the greater thickness of their ice. The Bezingi, Dych-su, Thuber, and Bashil glaciers constantly remind a Swiss climber of the Aar Glaciers, that is to say, of the least inclined and possibly thickest of all the Alpine glaciers.

Reaching the ice-fall of the Basil, we struck on to the rocks on its left bank, and were soon involved in very formidable difficulties, less than 300 feet of descent costing us more than three hours. The Tartar was, however, quite at home on rock, and climbed with a skill which would entitle him to a place amongst the best cragsmen in the Alps.

Below the ice-fall the glacier is nearly level, and as we tramped down we were delighted by the sight of cattle. We soon reached a large encampment of shepherds, and received a hearty welcome. The Tartars piled wood on to their fire, and long into the night they squatted round, turning the spits on which sputtered and frizzled the feast preparing for their strange guests.

The upper valley of the Basil-su can still boast a fairly extensive forest, but the ring of the axe sounds ceaselessly amongst it, and the sheep and goats destroy every young tree, so that the forest is shrinking rapidly, rotting stumps attesting its former limits. Passing through the forest, we emerged suddenly on open country and shortly after passed a ruined tower, which, if I understood the Tartar rightly, marks the point where the Suanetian sheep and cattle-raiders used in the old days to

be held in check; presumably, therefore, it marks the point above which sheep and cattle were not, in those old days, ever pastured. Below this point one may seek in vain not merely for a tree, but even for the smallest bush. As I walked down the valley I could not resist the conclusion that the presence and absence of forest in the Basil valley appears to have been determined by the absence or presence of sheep and goats in the past. And though I am doubtless generalising on very insufficient data, I am much inclined to attribute the extraordinary contrast between the treelessness of the northern valleys and the dense forests of the southern less to climatic differences than to the form in which the wealth of their respective inhabitants exists. In the one case, oxen, horses, sheep and goats, in the other well-tilled and neatly fenced fields and orchards. Though at first sight it appears difficult to believe that sheep and goats can destroy the forest over great stretches of country, a careful examination of the upper Basil-su shows that the cause is sufficient to produce a continuous contraction of the forest area, and leaves it a mere question of time as to when the last tree in that valley shall be cut down and burnt.

The next morning we rode across a low grass pass to Bezingi. We found the village *en fête*, and I promptly received an invitation to join in the festivities. I followed the tall native who had asked me, and we made a fairly straight line to his residence, occasionally scaling one side of a house, walking over the flat, grass-grown roof, and dropping down on the other side. Arrived at the scene of festivity, I was led to a seat and left to watch the proceedings. The youth and beauty of Bezingi, attired in silk dresses and trowsers of various and brilliant hues, were gathered in force, but, as sometimes happens nearer home, dancing men were very scarce. A strong tendency to lean up against convenient doorways and shirk their duty, having to be combated with much vigour by the stewards of the ceremony. The chief's son and an individual who appears to be his cup-bearer, proved, however, indefatigable in their exertions. The ladies disappeared between each set of dances, and during these intervals we had the Daghestan sword-dance and other similar performances.

Our object, however, in returning to the Bezingi Valley was not to indulge in a prolonged course of gaieties, but to try once again to make our way up Koshtantau. To reduce the quantity of luggage it was necessary to carry, we determined to go to a kosh or shepherd's camp on the left bank of the glacier, instead of to our old quarters on the right bank. Just as we reached the glacier a thick fog came down. Zurfluh and the Tartar were, as usual, far out of sight and hearing, engaged in a walking match for the credit of their respective nations. As I had only the vaguest idea of the whereabouts of the kosh, it appeared very unlikely that I should see them again that night. Luckily, after spending many hours seeking in various likely and unlikely spots

for the shepherd's dwelling, I rounded a big boulder and saw Zurfluh gazing disconsolately into the fog.

The kosh proved chiefly conspicuous by its absence, and beyond a black mark on a big rock showing where the shepherd lit his fire on the rare occasions when he happened to have any firewood, there was no shelter or sign of habitation. We quickly unpacked our tent and crawled into the welcome shelter out of the soaking mist, wondering meanwhile where the natives had got to. An hour later they turned up, and we learnt that they had been across the glacier to our old camp to fetch firewood. As the glacier is wide, and in parts very badly crevassed, this serves as an illustration of their good-hearted efforts to make the traveller comfortable.

The next morning there was still a dense mist, but as the Tartars declared the weather to be good, we struck camp and started, taking both of them with us. We had not gone half a mile when a sudden rent in the fog showed us the white slopes of our peak bathed in brilliant sunshine.

After we had been walking a couple of hours my old porter's foot-gear came hopelessly to grief, and he was practically barefoot. The stones on the moraine were sharp and he not unnaturally lost his temper, threw down his load and went back, so we had to redistribute the luggage, of which I came in for a good share.

About six o'clock we pitched our tent at a height of 12,000 feet, more or less, by the side of a little stream. Facing us, in dark shadow, towered the avalanche-swept slopes of Shkara and Djanga, whilst behind, the granite cliffs of Koshtantau glowed in the red light of the setting sun. I sat up late, for the world has few more glorious sights than the huge ridges which enclose the head of the Bezingi Glacier shining in the light of a July moon. I envied the physique of the Tartar shepherd, who had refused the offer of a place in the tent and had lain down on the bare stones and gone fast to sleep, whilst I, with my teeth chattering, had to creep into tent and sleeping-bag and leave the great peaks unseen.

Starting at half-past two the next morning, we followed the track I had taken when on my way to the great western buttress of the peak. Reaching the pass which looks down on to the lower Bezingi Glacier, we turned to the right, and in a few minutes were fairly on the mountain. Our way lay up great slopes of loose rock and broad gullies filled with snow and ice. For a time we made rapid progress, then the crags became steeper and began to require care; in places they were veneered with ice, in others a treacherous layer of frozen snow had to be hewn away before reliable hold could be obtained. Still the pace was good till we reached a point some 200 feet below the top of a great rock buttress that throws long shadows, like the hand of a gigantic sundial, across the southern face of the mountain. Here the work was obviously

of a different character, so we crept round a projecting crag to rest and stow our spare belongings into a secure cleft.

After a sharp struggle we gained the top of the buttress, and climbing along its narrow crest for a hundred yards or more reached another series of precipitous cliffs. A short distance further I called a halt on a suitable ledge, and we answered the shouts of the Tartar shepherd, whom we could just see on the pass we had left five hours before. The view was encouraging, nearly all the great peaks had sunk below us, and we could see, behind the Gestola-Tetnuld-Djanga ridge, the white crest of the Leila rising above the sunlit valleys of Suanetia. We should have halted long, but on the summit of Shkara hung a small white cloud, from which shreds and strips were at moments torn by the wind and sailed across the sky, throwing dark shadows on the snowfields below; even as we watched, one of these shreds became entangled in the ridge below, blotting out its jagged spires, and warning us that at any moment the cliffs around us might be veiled in impenetrable mist. Almost automatically Zurfluh shook out the rope (we had not previously found it necessary), and tying ourselves together, we set to work on the most formidable cliff we had met in the Caucasus. The rocks were firm, solid granite, and though they offered but scanty hold, that little could be relied on. Slowly we won our way upwards into the gap between the two summits, and could see that the cliff above was rent from top to bottom by a vertical crack. Up such a crack the climber can always force his way, and the last lingering doubt as to our success vanished. At one point, it is true, a great rock had fallen and wedged itself into the crack, barring direct advance, but this obstacle only temporarily checked us, and twenty minutes later we were on the top.

The wind was careering madly round us in a way which interfered with the exactness of our observations, and the small cloud on Shkara had grown into an angry mass, enveloping, not merely the peak, but hanging like a great pall over the Bezingi Glacier, hiding its icy ridges and snowy hollows in dark gloom. Beyond Gestola and Djanga we looked down on a compact mass of rolling cloud, above which the sharp ridges of Suanetia glittered like islands in the sun. Less than an hour before these valleys had been free from cloud, and the extraordinary rapidity with which it had gathered, made Zurfluh anxious about the descent. A fiercer blast than usual gave such point to his gloomy forebodings that, a stone-man having been set up to attest our victory, I dropped over the summit into the friendly crack, and climbed down to the gap between the two summits and out on to the great face of the peak. Here I lost the true line of descent, and was promptly relegated to the post of last man. All went well till we reached the top of the great buttress to which I have already referred. Here Zurfluh lost the true line, and being unable to recover it, had, at length, to lead straight down a cliff that had baffled our best efforts on the ascent. I

followed mildly protesting. Happily it was not long, and we regained the knapsack, packed up the rope, and rattled down the comparatively easy rocks to the pass. Our porter had already made his way back to the tent, and when we rejoined him, after a splendid glissade from the pass, found the fire alight and water boiling. He received us with a triumphal shout of "Allah, il Allah," and slapping us soundly on the back, hailed us as "Djighits."

It was too late to reach the kosh that evening, so we determined to spend the night where we were. Towards evening a slight shower of snow fell, and then as the moon rose the clouds began to roll away and the great ridges emerged from their fleecy wrappings in weird majesty over the dark gulf of the Bezingi Glacier.

The next morning we tramped back to Bezingi and packed up our traps preparatory to return to Naltshik. The first ascent of Koshtantau had been made, and we were content. Others will follow, some have already followed, and will bring back more important results and observations from this

"Tower of observance, searching space."

Too often the first climber must be content to march, axe in hand, a simple pioneer in front of the army of science; and his reward—outside Central Europe at least—is to be hailed, by those whose *à priori* theories of the physical characteristics of a region of which they know little he rudely upsets, as a "brainless gymnast." Map-makers in the Caucasus have laid down a single chain, great geographers have asserted that the glaciers are small; what is the Alpine Club to contradict them? For the present, what these so-called scientists "know not, is not knowledge." Perhaps the day may yet come when it may be admitted, even in text-books, that the Caucasus has parallel chains, complex ridges, enormous glaciers, and granite peaks still more formidable than those of the Alps. If it does, the knowledge will have been forced on geographers by "mere climbers."

2. THE PEAKS OF THE BEZINGI GLACIER. By H. W. HOLDER.

Without preliminaries, since you have already been carried to the field of war, I shall ask you to consider yourselves inmates, with myself, my friends Mr. Cockin and Mr. Hermann Woolley, and two Alpine guides, of our camp beside the Bezingi Glacier, at the Misséss Kosh.

Kosh is Tartar for a shepherd's cabin or shelter, and the Misséss Kosh is a small cave formed by a huge flat overhanging rock, with an earthwork wall in front erected by the natives, though not built of sufficient height to close up the front, and of a height from floor to roof of about 4 feet 6 inches. It is, I suppose, 8 to 10 feet long and 4 feet broad; though further back there is a shallower space which we found

extremely useful as a store cupboard for our tins of soup and tongue and other provisions. A large opening serves as a door, and near to the door two or three stones are arranged as a fireplace; and above the fireplace a hole is left for the escape of the smoke. Our Swiss guides christened the kosh the "Hôtel de l'Europe." It served as a storehouse, cooking place, and occasional dining-hall for us when the weather was too severe to admit of our taking our meals in the open air.

Our tent was of the well-known Whympet pattern, 7 feet square, with a couple of waterproof ground sheets, but being made, unfortunately, of ordinary canvas, it was not completely watertight. We had good stout horse-blankets and sleeping bags, and our ruck-sacks served as pillows. We took our meals usually in the open air. A flat stone was fixed to serve as our dining table, and our seats consisted of two or three stones piled one upon the other.

Our "hotel" was about 8400 feet above the level of the sea, and close to the broad level stream of the great Bezingi Glacier, which fills the centre valley or trough. Immediately opposite us, hanging on the opposite mountain side, was a small glacier, for which we obtained from the native hunter the name "Salananchera." To-day this glacier terminates considerably above the left bank of the Bezingi Glacier, but, judging from the moraine deposited between the two glaciers, it would seem as though there had, at no very distant period, been an actual junction between the two, and consequently that, in recent years, the Salananchera Glacier has been receding.

A series of five or six rocky peaks, with sharp rugged outlines, rose precipitously from the west bank of the Bezingi Glacier. The highest, which, we understood, was called by the same name as the glacier opposite to us (Salananchera), we estimated at 15,500 feet, from the fact that, when we were upon its summit, the clinometer indicated that it was just upon a level with the plateau from which the final cone of Gestola (Dent and Donkin's peak) springs. The lowest may perhaps be 1000 feet lower—not much less than the Matterhorn. Southward from our camp there arose the majestic range, from west to east, of Gestola, the Saddle Peak (Kartantau), Djanga, and Shkara, the first two being well in view without stirring from our tent. We were immediately under a bold peak which the natives called Misséa Tan, whilst a little south-east from this rose Koshtantau, the noble summit which we were fortunate enough to be able to ascend. As we were on a mountaineering expedition, we spent no more time at headquarters than was necessary for recruiting after exhausting climbs, or under stress of unfavourable weather. And in fact, "in camp," our experiences were of a sufficiently monotonous character.

We lived to a great extent on tinned provisions and biscuits, though bread and mutton were from time to time purchased for us in Bezingi or from shepherds, and brought up for us by our hunter, whom we kept

constantly in our employ to bring up firewood, assist in carrying our bags and cooking utensils when we were sleeping out, and generally to make himself useful. As he always carried a gun, more, we afterwards discovered, by way of sign of his calling than because of any intrinsic value it possessed, we once sent him to shoot chamois for us. He did it by proxy. And, of course, the man who shot the chamois ate it. So we got but little benefit. And when on one occasion we saw our hunter's gun taken to pieces to be cleaned, we never thought it possible that it could do much execution. The various parts were simply *tied* together by string, and the instrument in use, if it ever were fired, was likely to be far more deadly to the sportsman than to the creatures aimed at.

We had, during off days, our diaries to enter up; occasionally we took a short excursion to reconnoitre for some projected climb; and we had to take our bundles of soiled clothing "to the washerwoman of the neighbouring village," as the guides styled it; in other words, to some glacier pool, and try the effect of soap and ice-cold water upon them.

In this camp we spent twenty days, and our companion, Mr. Cockin, who remained behind us, thirty-one days. It was a life that had its hardships, but also its charms, and not the least of these was the contrast to Alpine experiences. Imagine a party camped beside the Zmutt Glacier, with no village or human dwelling nearer than St. Niklaus, and you will fairly appreciate our position.

As I have intimated, our chief object was mountaineering, and allowing for the changeable character of the weather and the unfortunate accident to Woolley's arm, which occurred on our third expedition, we cannot, I think, be fairly charged with laziness. We climbed Koshtan-tau (17,096 feet) on the second attempt; Kartantau, or the Saddle Peak, whose height we estimated at 16,500 feet, as it is considerably higher than Gestola, on a first attempt; and Salananchera (about 15,500 feet) also on a first attempt; besides getting to a height of about 16,000 feet on the Mishirgi Tau, and exploring the eastern upper arm of the Bexingi Glacier, and the ridge or *col* which runs first northward from Shkara and then gradually circles westward towards the Mishirgi Tau and Koshtan-tau. Mr. Cockin, in addition, after Woolley and I had been compelled to leave, climbed Shkara (17,200–17,300 feet), the second peak of Djanga (16,700–16,800 feet), and then, crossing to the south side of the chain and moving further to the west, ascended the northern peak of Ushba.

The most interesting and adventurous climb which we accomplished was, I think, the expedition on the Mishirgi Tau, when we failed to reach the summit, were benighted on our descent just after crossing the Schrund, and were compelled to spend some three hours on a ledge of rock at a height of 13,000 feet, without rugs or extra clothing, or food, or drink. The night was so cold that we were all in imminent danger of frost-bite, and the whole expedition lasted nearly 29½ hours,

exclusive of a four hours' climb to the sleeping-place the day before the attempt was made. But as we have no good view of the Mishirgi Tau, and as we have several most excellent photographs (taken by my friend Mr. Woolley) of Koshtantau, showing almost every step of the route we took, I shall describe our climb of the latter mountain as illustrative of the kind of work we had to do.

We started at 2.30 in the afternoon of the 19th August. Following the moraine on which our camp stood, we soon came upon the Misséss-Glacier, and at once struck up the middle of it, finding the ascent steep but easy. At 5.25 we had arrived at a ledge of rocks on the right of the glacier, which seemed to be a convenient place at which to spend the night. I may perhaps state here that this ledge can be more easily and more quickly reached by ascending a couloir which is passed before the glacier is struck. Only, in a wind, the couloir is raked with stones. We descended by this route, and did not enjoy the experience. Our sleeping-place was, as registered by the aneroid, 500 feet higher than our sleeping-place by the Koshtan Glacier, from which our first attempt upon the mountain had been made. This was so far in our favour. As we were by this time getting accustomed to the luxury of a hard bed, we spent a better night, and in consequence were somewhat late in getting away on the following morning, not leaving till 4.45. We crossed the glacier to our right, and arrived quickly at some screes or rocks, which lay immediately under the depression in the arête which we hoped to gain. We worked straight up these, having now and then a short bit of really good rock climbing, and then, to avoid the seracs of the icefall, which did not look promising, kept close to the rocks which bound the icefall on its right. We were really in a sort of cleft, with ice on the right hand and rocks on the left. This was the most disagreeable part of the whole climb. Step-cutting was frequently necessary, though early in the day water came trickling down, causing considerable annoyance. Occasionally the steps gave way as the second or third man got on to the rotten ice. Ultimately, however, all difficulties were surmounted, and we gained the snow-slope above the icefall. The slope was very steep, and steps had to be cut the whole way up to the depression in the arête. We reached the depression at eight, and stopped for breakfast. Below us was the Mishirgi Glacier. To the right arose the precipitous north face of Koshtantau and the "extraordinarily steep range connecting it with Dychtau." Directly opposite to us was Dychtau itself, though the mists prevented our forming any opinion as to its accessibility on this side. And to the north of Dychtau lay Mala Tau and Uku.

After breakfast we commenced our attack on the arête. First we ascended a snow-slope to the right of the actual ridge. At the lowest part of the slope, where the gradient was slight, we experienced no difficulty, as the snow was hard and easily traversed. Then, as the

gradient became steeper, steps had to be cut. As we neared the arête again, the snow became light and powdery, and climbing was difficult and tiring. Clouds collected and concealed all the summits, and a cold wind began to blow. The ridge was reached at 9.35. We worked steadily up the arête for nearly $1\frac{1}{2}$ hours, and then at 10.55 halted at the foot of a snow-slope for a short rest. The guides left the sacks, and we began to plough up the loose snow. At the top of the slope a steep bit of rock presented itself. It was smooth, steep, and really difficult, but fortunately free from snow and ice. There was only about 100 feet of it, but we all treated it with the greatest respect. Above this the rocks of the arête were half covered with snow, and needed care the whole way.

A little after one o'clock we sighted a peak covered with snow, which we at first thought was the true top. We pressed on and came upon it. Then we discovered that the true top was still farther on, and was separated from us by a depression of from 50 to 100 feet. This was composed of jagged dark rocks, almost free from snow on the side turned towards us, and surmounting the highest crag was a slender cairn, which had been built a short time before by Mr. Mummery, on making the first ascent of the mountain. We hurried on, scrambled up the rocks, and at 2.5 p.m. stood upon the top of this noble peak. But we did not stay long. The wind was bitterly cold. The clouds looked more and more ominous. For a moment the top of Dychtau was visible, and by the clinometer was seen to be somewhat lower than the peak on which we stood. We hastily gathered a few stones, scribbled on our cards an intimation that on August 20th, 1888, we had climbed the mountain by the northern arête, deposited them in a sardine-box, and then began rapidly to descend. By 6 p.m. we had arrived, without special incident, at the place of our morning's bivouac. We rested for a short time, and then started down the snow-slopes. But how were we to get over the icefall? Our morning's route was certainly impracticable so late in the day. Our best course, probably, would have been to have descended by one of the couloirs to our sleeping-place. But certain garments and other articles had been left on the glacier at the foot of the cleft, and this fact led us, in an evil moment, to decide on venturing down the rocks to the north of the cleft. It was possible these rocks would prove practicable, and if they should they would serve our purpose admirably. For a short distance all went well. Then, as the darkness deepened, our difficulties and our dangers increased. The character of the rocks was of course unknown, and we had nothing to guide us as to the best line in which to move. We were compelled to use the utmost caution. The rocks proved loose, and huge stones, dislodged by members of the party, frequently went crashing down hundreds of feet. Twice it was necessary to bring into requisition a smaller cord to steady us over steep faces of rock on which sufficient hold could not be found. It would,

doubtless, have been bad enough in daylight, but in the dark the peril was extreme. More than once it seemed doubtful whether we should not be compelled to halt, resting on some narrow ledge, and wait for dawn. We did, however, steadily continue to descend. By-and-by we reached a couloir filled with snow. There were indications that in this couloir we were by no means safe from falling stones. But we lost no time, and soon, without accident, reached our sleeping-place at 10.45 p.m. and turned in for the night. Our camp was regained by the couloir to which I have referred at 10.30 on the following morning.

I have explained that we were mountaineering and not surveying, and also that our headquarters for the three weeks we remained in the mountains were in the one position. You must, therefore, not be disappointed if our topographical discoveries were of a somewhat meagre character. Unfortunately, when we were at the top of our highest peaks, there was so much cloud and mist, and the wind was so cold, that scarcely any accurate observations could be taken. A clinometer and a compass were the only scientific instruments we could avail ourselves of, and our main results are, consequently, estimates of heights and directions.

From the top of Koshtantau we ascertained that it was somewhat higher than Dychtau, thus confirming the first measurements of the Russian Survey. From the top of the Saddle Peak—Kartantau—we learnt that it was considerably higher than Gestola and judged that it could not be much less than 16,500 feet.

The Mishirgi Tau we estimate at somewhat over 16,000 feet, inasmuch as, at the height where we were brought to a standstill, we appeared to be about on a level with Gestola, and we did not seem to be more than 200 or 300 feet below the actual summit of the mountain. The height of Salananchera has already been referred to, and the height of our camping station (8400 feet) Woolley calculated from observations he took of the boiling point, &c.

We discovered that Mr. Freshfield had misplaced Mishirgi Tau, which lies but very little to the south-east of Koshtantau, and to the west, not to the east, of the junction of the ridge from Shkara with that shown in his map as extending from Koshtantau. There are no rocks on the western side of the Shkara Pass, but on this side the eastern arm of the Bezingi Glacier opens out into a large snow basin, and a ridge of rock runs down constituting the north rim of this basin, and dividing it from the great flow of ice which descends from Mishirgi Tau and Koshtantau.

Kartantau is certainly not correctly placed as lying due south from Gestola, and is much nearer Djanga than shown on the map.

As, from the top of Salananchera, Dychtau appeared to be almost due east from us, Salananchera is placed a little too much to the north. The position of Dychtau is taken from the 5-verst map, on which it is one of the very few points fixed by triangulation.

The glacier descending from Salananchera towards the Bezingi Glacier is certainly much more prominent and descends farther than is indicated, whilst it is not cut off by a rocky ridge from, but runs up to and forms a part of, the great snow basin which extends to Tiutiurgu on the north-west.

The most important discovery was, I think, the fact that Salananchera is most admirably situated for topographical observations. It is sufficiently low to be easily climbed before the mists close up the view, usually about one in the afternoon. It commands a view of the summits of all the great mountains of the central group. There is no really dangerous climbing to be done, so that, with a little extra help, all needful scientific instruments, and even a camera, could, without serious difficulty, be carried to the top.

By way of nomenclature, we obtained the name of Kartantau for Mr. Freshfield's Saddle Peak (a name already obtained in Suanetia twenty-five years ago for the same ridge by Dr. Radde), Salananchera for his unnamed peak to the north-east of the Zanner Pass, and Missées Kosh and Missées Tau for our kosh and the peak immediately above it.

You will not here be specially interested in the differences between the Alps and the Caucasus from a mountaineering point of view. But there are striking differences in the character of the mountains themselves which form the two great chains.

I was impressed with the wildness, the majesty, and the awfulness—if you will allow me to use the word—of the Caucasus. I never felt so much before the sense of being alone with the mountains, the absolute absence of suggestion or thought of valleys, or plains, or lakes, or rivers, or life and civilisation. Not only the heights, but the abrupt precipices and the weird effects of majestic peaks peering above or frowning through thick mists fascinated and enthralled me.

Whilst the main glacier streams, e. g. the Bezingi, the Mishirgi, and the Dych Su, so far as we could see, have but a slight fall, and are but little crevassed (we never used the rope on any part of the Bezingi Glacier), the upper parts of the glaciers, those which come down from the mountains to form the great streams, have so steep a fall that they may be compared rather to cascades than streams of ice, and are cut into seracs of the most fantastic character. Comparatively little snow lies on the steep southern faces of the mountains, and the rocks which face the south are so broken and loose that the danger of falling stones in ascending and descending is extreme. No single bit of rock can be trusted, and the rope ought never for a moment to be discarded. On the northern faces much more snow lies, and, so far as we had experience, the rocks were firmer and more reliable.

The climate of the Caucasus is healthy and invigorating, yet, I think, distinctly more humid than in the Alps. I had a slight cold on reaching the mountains, and a little catarrh clung to me nearly the

whole of the time I remained. In the dry atmosphere of the Alps a cold has usually quite disappeared in the course of two or three days. It may perhaps be sufficiently interesting to note that none of us experienced the slightest inconvenience on account of the rarity of the atmosphere at the highest altitude we reached, over 17,000 feet; but that above about 15,000 feet the snow was always of the light and powdery character so tantalising and fatiguing to mountaineers.

Note on the Geological Character of the Rocks of the Central Group.

Professor Bonney has been kind enough to give me his opinion on the half-dozen stones I obtained from the summit of Koshtantau. His description is as follows:—

"1. Felspar, mica (it is difficult to say whether the dark mineral is an altered black mica or partly hornblende—a little white mica), and some quartz. I think the rock is probably of igneous origin, a granite not rich in quartz, but has been a little modified by subsequent pressure.

"2. A hard mica-schist or micaceous gneiss, traversed by a vein partly of felspar; plenty like it in heart of Alps.

"3. Quartz and muscovite mica, probably from a vein.

"4 and 5. Chiefly quartz, probably from a vein.

"6. Quartz, felspar, and an altered mica or hornblende. The rock is very probably of igneous origin, a little affected by subsequent pressure.

"Note.—Some of the green spots in the above specimens might even be a dark-coloured epidote. 3, 4, and 5 tell us nothing except that they are likely to have come from a series of distinctly crystalline rocks."

I brought one stone from the top of the Saddle Peak. Professor Bonney's opinion upon it is as follows:—"The rock appears to consist of felspar, mica, and some quartz, the greenish colour in one part being probably due to an alteration of the mica; but there may be some hornblende, or even epidote, but as the constituents are not very distinctly crystallised, it is not easy to be sure without microscopic examination. There seems a slight foliation. The rock might be a granitoid gneiss or a gneissoid granite, and is such as one often finds in the heart of a great mountain chain."

His general impressions on the whole series are as follows:—"The rocks are coarsely crystalline. They do not bear very marked signs of crushing, but still have probably been modified in the 'mountain-making.' They are such as one might find in the parts of the Alps where, as one believes, the older rocks are exposed, e.g. parts of the Central Oberland, parts of the Pennine about Monte Rosa, and the like. They do not resemble the more friable gneisses so largely developed in the Lepontine Alps, nor any of the great series of schists which seem to form the top of the Alpine crystalline series, and which may be traced from the extreme east to the extreme south-west.

"The rocks of Guluku (see Proc. Roy. Soc., May 5th, 1887) had a slight resemblance to these, but were more crushed."

Professor Bonney has not remembered that *Guluku* is the name which was applied to Koshtantau by Mr. C. Dent. But the specimens reported on in 1887 would be obtained from *low down* the mountain, whilst those I brought were almost from the very top.

It may perhaps be of interest here to state that on the ridge running north from Shkara I picked up, at a height of about 14,000 feet, several pieces of stone covered with a rich red-coloured lichen, which I am told is of the species *Placodium minutum*, and not usually found so high.

3. NOTES ON THE LAST JOURNEY AND PHOTOGRAPHS OF
MR. W. F. DONKIN. By C. T. DENT.

In drawing up the following brief notes I have largely made use of the late Mr. Harry Fox's diary, which has been kindly placed at my disposal by his relatives. Of the series of views taken during the summer of 1888 by Mr. Donkin, it has only been found possible to develop a very limited number. It is matter for profound regret that with few exceptions, the negatives have been found hopelessly damaged by damp, and perhaps also by an exposure to light. Probably this misfortune was due to some accident to the camera. Although the views are by no means up to the standard of Mr. Donkin's Alpine work, they yet have so much personal interest that on that account alone they are of the greatest value. But they have an importance beyond that of mere sentiment, for some of the views, though faint, have been taken from points selected with the photographer's well-known judgment. For instance, the series of views from the top of Dongusorun are of high topographical value, and reveal much of a district of which little is as yet known. To the energetic and courteous co-operation of the Russian officials—high and low—and of our own Foreign Office, we owe the recovery of any negatives at all.

On August 2nd of last year the party reached Kutais, and at once went on towards Suanetia by the Rion Valley. There is now a very fair carriage road to a post-station called Alpan, lying south-east of Tsageri and about four or five hours' ride from that village, and it is possible to drive the whole way from Kutais to Vladikavkas by Oni, the Mamisson Pass, and the Ardon Gorge. The road therefore cuts right through the main Caucasian chain, passing east of the great Adai Choch group of mountains. A postal service is kept up along this route, but comparatively few seem to be aware of the facility for travel. Those who do not know of it strenuously deny that the road exists at all. We were informed by several Russians that it was altogether impossible to drive more than a few versts beyond Kutais, and this statement was even corroborated by some of the inhabitants of Kutais itself. The future guide-book to the Caucasus will have been largely compiled by English travellers. Probably by this year a branch road will have been extended to Tsageri, and thus the traveller will be able to drive to the very opening of the Tsenes Tskali Gorge.

From Lentechi, at the head of the Tsenes Tskali Gorge, the party crossed over the Leila range, one of the well-marked mountain ridges, parallel to the main chain, so characteristic of the Caucasus.

The descent was thus effected into the valley of the great Ingur river which drains the southern flanks of the Central Caucasus. The path between Latal and Betsho gives magnificent views of Ushba, and Donkin took full advantage of his opportunity. Of all the photographs taken, indeed, none have suffered so little as the pictures showing the great

rock pinnacles towering above the pine-trees near Betshe. Donkin was a man who rarely showed enthusiasm openly, but I well remember the excited way in which he made his preparations for taking these photographs. It was, as all agreed, the grandest mountain we had ever looked upon, and, seen on an almost perfect day, the view was one that can never fade from the memory.

On August 9th the party made camp by the side of the Gul, or Gulba, Glacier. From this point the view of the Leila chain is impressive. As may be seen in some of the photographs, two high peaks south-west of the Leila chain, and separated by a tributary of the Ingur, are probably nearly as high as the main mass. These peaks have been ignored in most maps. The whole district of the Leila would well repay careful exploration at its western extremity.

An attempt to ascend the northern peak of Ushba was frustrated by the weather and the state of the snow. But Donkin seldom failed to turn even a mountaineering failure to some topographical account and he secured a very valuable series of views from the highest point reached.

The photographs show finely the great curve of the main chain and the waterparting, from the heights above the Adyr Su, in a south-easterly direction, extending as far as the Adai Choch group. The subsidiary ridges, between which lie the streams joining to form the Ingur, lie parallel to the main chain, and the chain itself is finally, as it were, broken through by the Ardon.

An attempt was made on the southern peak of Ushba on August 13th, but the mist prevented any photographing. On August 16th the party left Betshe in order to traverse the chain by the Betshe Pass to the north side. Camping high up in the valley lying immediately west of Ushba, and leaving the camp at 3.20 a.m. on August 17th, the mountaineers succeeded in ascending the south-eastern peak of Dongusorun, about 14,500. The central peak is higher, being 14,600. The day was fine, and it is matter for infinite regret that the numerous photographs taken have been more or less damaged by light and damp. Still the views will prove of the highest topographical value. Ushba was estimated, as Mr. Freshfield had anticipated would prove to be the case, to lie about half a mile south of the waterparting. The views reveal a district—that around Ushba—which is practically unknown, and show the amount of topography yet to be worked out in this one limited area. I trust it may attract some of a constantly increasing class—namely, men who, like Mr. Mummery, Mr. Holder, Mr. Cockin, and Mr. Woolley, and like our lost friends Messrs. Donkin and Fox, desire to turn special training in mountaineering to valuable geographical account. It is by explorers in such fields that light can be thrown on some of the many unsolved questions of physical geography. It depends on the mountaineering skill and experience of the explorers whether the

act be one of culpable folly or one as valuable as justifiable in the interests of geographical science.

The porters, who under the charge of the interpreter, had made their way with the baggage over the Betsho Pass, were rejoined on August 13th.

Daily traffic is carried on over the pass in fine weather, and the travellers met a herd of goats which were being driven over the pass. The descent was then made by the Baksan Valley to Urusbieh. A far finer and more direct pass could probably be made directly into the Adyl Su Valley by the Schichildi Glacier. The ascent of Dongusorun was, however, considered more important from the topographical point of view, and no more time could be devoted to the Ushba district, as the travellers were anxious to visit the central group and particularly the range of Dychtau. In pursuance of a desire to establish a series of glacier passes between the Baksan Valley and Tchegem and Bezingi, the travellers crossed by a new glacier pass, which Mr. Donkin described as "splendid," from the Adyr Su Valley, across the great spur between it and the Bashil Su, or head of the Tchegem Valley. The highest point of this range has been recently determined by the Russian survey as 14,273 feet, and is situated well north of the main chain, about the middle of the spur where a strongly marked secondary ridge is given off to the west and thus shuts in the head of the Adyr Su. The line actually taken probably lay close to this point but a little south of it.

A note in Mr. Fox's diary mentions that Mr. Donkin changed the roll of paper negatives at Urusbieh. There is no hope therefore that any photographs of the pass will ever come to hand.

On August 24th the party reached Bezingi. The subsequent details of the journey and the sad calamity that brought it to a premature end, have been elsewhere so fully given that it is unnecessary to recapitulate them here. Nor will I allude further to a disaster which the lapse of time seems rather to intensify than alleviate. But, in mourning the loss of such brilliant promise, let us not forget that there was much fulfilment of promise; and that Messrs. Donkin and Fox have well earned the credit due to explorers of little-known regions; for as mountaineers and geographers they set about their work animated by the true spirit of scientific enquiry.

The following discussion ensued on the foregoing papers:—

Mr. D. FRESHFIELD said he was sorry to have to trespass on the patience of a meeting which had already listened to three papers. But for once he must decline to subscribe to the opinion of Fellows who pretended that ten o'clock was a "late hour in the evening." First he referred to the report that an administrative severance might shortly take place between the Transcaucasian Territory (the region excellently described to the Society by Mr. Curzon, a fortnight before) and the Caucasian Provinces. This change could hardly fail, in his opinion, to be beneficial to the former. The constant claims of the Transcaucasian Territory on the thoughts, the energy, and the funds of the Government at Tiflis had been somewhat of a

hindrance to the rapid material development of the Caucasus. The great dam of the Murghab, at Merv, had been the chief subject of conversation among the officials he had met two years ago. There were plenty of profitable works waiting to be accomplished between Batoum and Baku, and it might be hoped that these would speedily be taken into consideration.

Turning to the subject of the papers of the evening—the further exploration of the central group of the Caucasus by skilled mountaineers—Mr. Freshfield expressed his regret that, in the absence of Mr. Cockin, his brilliant feats, the ascents of Shkara, Djanga, and Ushba might seem to pass without adequate recognition. Since Mr. Whymper's great campaign in the Alps, twenty-four years ago, no similarly rapid succession of mountaineering victories had been recorded. The ascent of Shkara, a mountain 1500 feet higher than Mont Blanc, and second only to Elbruz in the Caucasian chain, was one of the longest and most arduous climbs on record. Ushba, the Caucasian Matterhorn, was only conquered by dint of a determination that was proof against the season, the weather, and the temporary collapse of a companion. September days shortened, fresh snow fell, one of his two Alpine guides was crippled by rheumatism; yet Mr. Cockin persevered, and on the 28th September he and Ulrich Almer, of Grindelwald, planted their ice-axes on one of the crests of the double-headed giant of Suanetia. Journeys such as they had heard of that evening, might be regarded as the beads of adventure that make up the necklace of science. They helped to drive still further into the background ancient error. The old text of the leading Dictionary of Geography, "The peaks of the Caucasus are either flat or cup-shaped, the existence of glaciers is uncertain," would soon be finally forgotten, and even schoolboys would be given correct impressions of the physical characteristics of one of the noblest and most interesting mountain chains of the Old World. These bold ascents might at first sight appear to bear no immediate scientific results, but they seldom failed to lead, in one way or another, to the increase of knowledge; and they were, taken at the lowest, splendid evidences that where there was anything difficult to be done or won, whether "over floods that are deepest," or "up rocks that are steepest," English energy would still find out the way.

His hearers would, he thought, agree, however, that it was in the present case quite unnecessary to fall back on this point of view, if they would be at the pains to compare the map of the chain north of Suanetia in their hands with that in Reclus' 'Géographie Universelle.' The topography of the Baksan sources and some of the heights given were the result of the recent and as yet unpublished work of MM. Djukoff and Golovievsky of the Russian Staff, but the representation of the main chain and its glaciers from the Pasi Mta (the pass at the source of the Phasis) to Dongusorun near Elbruz, a distance of some 40 miles, was the work of individual climbers. It would be still, doubtless, largely corrected, and rendered more precise in detail in future years by the work of the Russian surveyors, but this great advance had been secured, that the map no longer gave a false general impression of a narrow single chain destitute of large glacier basins and high snowclad spurs.

The travellers whom they had listened to had not dwelt in any detail—before a large audience it was seldom expedient to dwell in detail on such matters—on intricate points of orography and hypsometry, such as the relative positions and heights of the peaks of the central group, which their climbs had done much to clear up. Other matters of scientific interest, such as the memorandum furnished by Prof. Bonney on the geological character of the rocks brought home, would doubtless be printed in the Proceedings. He would imitate their reserve, and not even discuss one or two points where he might desire to comment on their observations on his sketch map. What would they be the wiser for an argument between Mr. Holder and

himself as to the precise position of Mishirgi Tau? In point of fact the mountaineer in the Central Caucasus shares to some extent the privilege of Adam in the neighbouring Eden, and can name peaks much as he likes. His difficulty only arises when he tries to persuade his successors to agree with him! From his (Mr. Freshfield's) point of view, Mishirgi Tau is the flat-topped wall of rock and ice that closes the middle reach of the Mishirgi Glacier: from Mr. Holder's it is a bold rock-tower which forms the eastern buttress of Koshtantau.

Nor would he argue at length with Mr. Mummery whether that traveller had found in the devastations of cattle an efficient cause for the startlingly sudden alternations from barren downs to dense forests characteristic of the Caucasus. Soil, he believed, had a great deal to do with this variety in the scenery. He would be sorry to take away from the cattle-lifters of Sunnetia any credit they might justly be entitled to as Forest Conservators! But he had noticed that, as a rule, the friable schists were bare, the limestone and granitic glens well wooded.

One criticism he might venture to address to the modern school of climbers through their representatives. For mountaineers, when they come into the wider field of Geography, must not expect that mutual admiration which they were sometimes credited with bestowing on one another in more select assemblies. He noticed, that if some of his younger friends (he did not mean to refer to the gentlemen who had just read papers to the Society) climbed better they travelled less than their foregoers. The *Homo unius libri* had perhaps found his parallel in the *Homo unius vallis*. Mr. John Ball had in his admirable 'Alpine Guide' shown a proper acquaintance with the whole Alps; his successors sometimes seemed almost too intimately connected with a single district. The modern tendency to specialisation was often carried to extreme even in our recreations, nor was it only with regard to the extent of their field that it affected mountaineers. As mountaineering became more of an art its devotees had less attention to spare for anything outside it. A crack carman was apt to think more of his own and his companions' "form" than of the river banks, and a crack mountaineer tended to become less of a naturalist or an observer. Let the Alpine Club remember that it inherited the traditions of De Saussure and Agassiz, of Forbes and Tyndall; that it had had among its Presidents Mr. John Ball, and Mr. Wm. Mathews, and Professor Bonney. In the struggle and excitement of a *first ascent* it was often hardly possible to divert the attention from the immediate problem. That was a reason for repeating those ascents with greater results; but not for disparaging the pioneers who had made such results obtainable. He submitted these suggestions in all humility, and he trusted without offence. For it was both right and expedient that mountain explorers in distant ranges should all hold together. On one hand of them they had always the Deep Sea of Ignorance. For instance, in his own case, some of the minor scientists of Tiflis had for the last twenty years asserted, and doubtless they still asserted, that he had never climbed Kasbek. The same men, he had heard on high authority, were equally ready to argue against Dr. Radde that it was an *à priori* impossibility for flowers to blossom on rocks above the snow-level! To such critics everything outside their own limited experiences was incredible. They might well learn a lesson from one of the Caucasian stories of the great Russian novelist Count Tolstoi ('The Wood-cutting Expedition'), in which the wit of the regiment recounts to his comrades his experience with his fellow-villagers when he got leave of absence—"Indeed it is a strange people, they believe everyone. But still, when I began to tell them about Mount Kasbek and how the snow does not melt there all summer, they burst out laughing at the absurdity of it. What a lie! they said; could such a thing be possible? A mountain so high that the snow never melts on it!" On the other hand mountain explorers had

occasionally to deal with the Simple Simons of alpine literature, who never having been explorers themselves could not realise the difference between a night at a Swiss Clubhut and a month at a Kosh beside the Bezingi Glacier. One such writer, who might possibly be taken by the public as of some authority, had recently stated that any dangers and difficulties encountered by the early explorers of the Caucasus were mainly owing to their own inexperience. So far as the speaker and his companions of 1868 were concerned, that statement was untrue. He had always under- rather than over-estimated the difficulties of Caucasian travel, and he had, indeed, been recently remonstrated with on this account by M. de Déchy. He had felt it his duty, in the position he had the honour to hold, to say thus much in answer to repeated provocations. He took this course not so much on his own account, as because he had found the result of letting such reflections pass unnoticed was that they were apt to be repeated in more distant quarters of the globe with regard to explorers for whom it was perhaps not so easy to reply conclusively to their traducers. But he turned gladly from "the early explorers of the Caucasus" to consider the prospects of the future explorers—for whom, in the western and eastern wilds, among the solitudes of Circassia and the fastnesses of Daghestan, a wide field was still open.

The Turko-Russian war of 1877 had marked an epoch in the subjugation of the Caucasus. From that date the highlands had been held in a firmer grasp. Order and civilisation had begun to take hold of the mountain tribes. Murder and robbery were no longer to be feared, as when he had first visited Suanetia twenty years ago. The Russian language was now often spoken by at least one person in a mountain community. The village chiefs in some districts were even beginning to appreciate that travellers who pay for all they get are profitable guests. The key to a Starshina's heart lay in his pocket. Not of course that an open purse was by any means the principal requirement for Caucasian travel; indeed, extravagant payments were very much to be deprecated. Among half-civilised and primitive races patience, tact, and energy were all called for. A traveller should never let the villagers know that he is in a hurry, or that he cannot do without their aid. If he does, they will raise their terms, and indulge in the sole social pleasure of their lives—an interminable bargain. Caucasians will seldom respect the traveller more for a show of temper on his part; and as it is their tradition to go armed to the teeth, and their habit when moved, to draw their daggers, it is clearly their guests' policy to observe the limits of polite discussion. He said thus much because he believed many visitors would be attracted to the Caucasus, and he felt that a single raw traveller might do much harm, and re-create difficulties which had been to a great extent removed by the discretion of the climbers of last year.

These words, "the climbers of last year," must bring back to the minds of most of those present the grievous calamity which had overshadowed all the successes of the summer of 1888 in the Caucasus. Some of the climbers of last year they had welcomed that evening; but where were those from whom they had expected most? "For every life lost in the mountains thousands have found health, strength, and happiness." That may be—is true; but what consolation can the commonplace bring for such loss as has been suffered by the friends of Mr. Donkin and Mr. H. Fox, or by the relatives of their faithful guides?

In Mr. Donkin science had lost a devoted student, and nature (as well as music) a true lover and most skilful interpreter, one who by his singular skill and enterprise had opened to exact observation a new region, that of the mountain-tops. Others—Mr. Ruskin, for instance—had used photography to represent the great peaks from below. But Mr. Donkin took them on their own level; Mont Blanc from the Aiguille du Géant, the Matterhorn from the Weisshorn, the Oberland peaks from

the Schreckhorn. His last work was a panorama of the strange snows of the Caucasus from the summit of Dongusorun. "When I wrote the first volume of 'Modern Painters,' Mr. Ruskin had recently written, "scarcely any single fact was rightly known by anybody, either about the snow or ice of the Alps. Chiefly the snow had been neglected; very few eyes had ever seen the higher snows near; no foot had trodden the greater number of Alpine summits, and I had to glean what I needed for pictorial purposes as best I could—and my best was a blunder." And again Mr. Ruskin had written, with special reference to Mr. Donkin's photographs, "Anything more beautiful than the photographs of the Valley of Chamouni now in your printsellers' windows cannot be conceived. For geographical and geological purposes they are worth anything."

Now all eyes might see the upper snows. And this had been the result of one among the recreations of a hard-working and very variously accomplished gentleman, who, never seeking fame of any sort, did his best quietly and conscientiously in everything he undertook, and had consequently left an example that would bear fruit, a memory that would not easily be forgotten. Less than he had said—Mr. Freshfield concluded—it would have been impossible for him to say on the present occasion. If he said no more it was because he felt that panegyric of any kind was the last offering that would be welcome to the modest spirit of his old friend. These few words to his memory were a tribute due from the Geographical Society. In the Chapel of Eton College an appropriate brass, decorated with the pale ranunculus of the snows, would form a more permanent memorial to the Etonian whose resting-place was far off in the sanctuary of nature, where the radiant pinnacle of Dychtau would henceforth stand as a memorial to the lost mountaineers.

Mr. J. ANNAN BRYCE said that when he arrived in the Caucasus last year it was too late to do any mountain work. He was forced to stay at Batoum for two months, and during that time he had an opportunity of getting magnificent views of the chain of the Caucasus from the mass of Shkara on the east to the extreme west, where it sinks into the Black Sea. To the W.N.W. of Elbruz there was a group containing three magnificent summits, to one of which he would apply, rather than to Ushba, the name of the Matterhorn of the Caucasus. It had the rearing-horse appearance which the Matterhorn had. It stood up with a grand crest, and had at the back of it a long slope, which reminded him of Chumulari, on the boundary between Bhutan and Sikkim. Beyond the group which contained these noble summits, about 140 miles from Elbruz, there was another group which had some fine peaks. He could certainly recommend those western groups to the attention of future explorers, and also a group of fine summits to the east of Kasbek, and nearly due north of Tiflis, which he thought would afford great attractions to an able climber.

The CHAIRMAN in proposing a vote of thanks to the authors of the papers, referred to the remarkable exhibition of Mr. Donkin's photographs, then open in Bond Street, an exhibition which, he said, would not fail to give both pleasure and instruction to those who visited it, and must add to the regret felt by all who knew Mr. Donkin or his work, that his life had been so lamentably cut short.

Note on the Map (p. 404) of Elbruz and the Central Caucasus.

By DOUGLAS W. FRESHFIELD, SEC. R.G.S.

THE map appended to these papers represents the chain north of Suanetia between the Zanner Pass and Elbruz for the first time with any approach to correctness. The sources of the Baksan from Elbruz round to Dongusorun are laid down from a

map by M. Golovievsky, of the Russian Staff, an admirable piece of work, the first fruits of the new survey. In this map the watershed south of Elbruz is moved over four miles more to the northward than on the five-verst map, and Elbruz is brought, consequently, nearer to it by this distance. The head of the Betsho Valley, as well as the snowy chain south-west of it, had been ignored in the five-verst map. Mr. Donkin's photographs prove, what I had long ago asserted, that the twin peaks of Ushba lie close to, but not on, the watershed, in a position comparable to that of the Ortler in the Alps. The basins of the Zanner, Thuber, and Gvalda glaciers on the south, and of the Bashil-su and Adyr-su on the north side are laid down from the observations of recent English travellers. M. de Déchy's photographs and notes have been useful for the Thuber Glacier and the head of the Neskra Valley. The details of the topography of the glaciers north and west of Elbruz, of the Adyl-su gleus, of the great Chegem apur, and of the Kara-su and Bulungu basins on the north side are to some extent speculative, and require to be filled up. This will doubtless be done by the combined work of the Russian surveyors and independent explorers. A few years' experience with Alpine guides will render the mountain Tartars capable of accompanying engineers to most of the points suitable for survey purposes. M. Djukoff's authoritative map of the central group will be awaited with much interest, and it is greatly to be hoped that he and M. Golovievsky, or their colleagues, will be authorised to continue their labours until they have covered between them the whole ground between the Nachar and the Mamisson Pass.

Many of the heights given are derived from M. Golovievsky's map or have been kindly communicated by General Shdanov, of the Caucasian Staff, through whom I have also learnt that the peak for which a height of 15,947 feet was recently obtained was Gestola, and not Tetnuld. The heights of communes in Suanetia are the result of practically identical barometrical observations taken on different occasions by M. de Déchy and myself. Some of the heights of passes are M. de Déchy's, the remainder are derived from various sources. As a whole, the map must be considered as tentative. Part of its value will consist in its exhibiting exactly where further topographical work is most needed.

GEOGRAPHICAL NOTES.

Dr. Nansen.—The adventurous young Norwegian, Dr. Fridtjof Nansen, who succeeded, last summer, in crossing, with his party, the inland ice of Greenland from east to west, has arrived at Copenhagen, and has accepted our invitation to give us an account of his journey and its results at our next Evening Meeting, June 24th.

Lecturer in Geography at Cambridge.—Mr. J. Y. Buchanan has been appointed to the post of Lecturer in Geography at the University of Cambridge, vacated by the retirement, through ill health (before he had entered on his functions), of Dr. Guillemaud. Mr. Buchanan will be remembered as a member of the scientific staff in the voyage of the *Challenger*, and as the author of papers read at our Evening Meetings "On Similarities in the Physical Geography of the Great Oceans," and "On the Distribution of Salt in the Ocean."

German Explorations in West Africa.—Several short exploring trips have recently been made by various German travellers in the German territory of the Cameroons, and also along the Gold Coast, and others are in course of execution. At the end of last year Captain Kund, in company with Lieut. Tappenbeck and a strong caravan of 240 men, started from the Batanga coast upon his second journey to the upper course of the Sannaga and Njong; the survey of the lower part of the former river, carried out by Captain Kund, shows that the river lies seven minutes further to the west than represented on existing maps. Lieut. Zeuner made a brief excursion at the end of November through Mambanda into the Bafarami Mountains west of the Mungo river. The contemplated ascent of the culminating point of the range had to be abandoned in consequence of the unfavourable weather. On the 17th December Dr. Zintgraff set out from Barombi station on his long projected journey to the country of Adamaua lying to the north-east. In the Gold Coast region Dr. L. Wolf made a trip from the station of Bismarckburg to Salaga, passing through the hitherto unknown Udjuti country. Captain v. François and Lieut. Kling have also been exploring new routes between the various German stations in the interior and the coast.

Nomenclature of the Mountain Ranges South of the Lob-nor District.—Mr. Delmar Morgan writes to us on this subject as follows:—On comparing the map accompanying the late General Prjevalsky's last book with that drawn in the Trigonometrical Survey Department in India from the late Mr. Dalgleish's observations, I have noticed certain discrepancies in the names of the ranges. Mr. Carey, to whom reference was kindly made by General Walker, writes: "So far as we could learn, the name 'Altun-tagh' is not used at all by the Lob people, who speak of the hills immediately to the south of the Lob-nor plain as the dry hills or the barren hills. There seemed to be no recognised designation of the range. To the Lob people proper the name Altun-tagh was quite unknown, but our guide from the Khoten settlers in the village of Chaklik told us that the designation was in use farther to the west for the hills from which gold is obtained. I believe it was from this information, and because the name already appeared in our maps, that it was used by Mr. Dalgleish. The gold digging is all done by the Khotenis, the Lob-nor people themselves being afraid to venture far into the mountains and altogether less enterprising. Whatever the correct name of the range of hills lying between Chaklik and the Chiman plain, the highest ridge of which was crossed by us at the Tash Dawan, may be, I have no doubt at all that Mr. Dalgleish is perfectly right in his location of the Chiman-tagh range. This lies to the south of the Chiman plain, and its main ridge is crossed at the Amban Ashkan Dawan (pass). There is a story that a Chinese official from Turfan once came as far as this pass and crossed it, hence the name, which means 'pass opened by the Amban.' I think it

would be a mistake to apply the name Chiman-tagh to any of the hills to the north of the Chiman plain. We regarded the hills between the Lob-nor and Chiman plains as one range of mountains, and my impression is that in writing the words Altun Range where he did, Mr. Dalgleish did not intend to treat the comparatively low ridge between Uzen Shor and Chiman Bashkul as a separate and distinct range. I am aware that he always took the greatest pains to get the names correctly. The Chiman Tagh is a clearly defined range, and I think his map shows it in the right place."—With reference to the same subject, Prjevalsky says in his last book: "The information collected during my journey to Lob-nor (i.e. in 1876) does not agree with what we now heard. The inhabitants there told me that if we went south by the old route formerly followed by the Kalmuks in their journeys to Tibet, we should, after crossing the Altyn-tagh, come to a wide plain 37 miles in width. Beyond it lay another transverse range 13 miles wide, having no separate name, and beyond this again another plain, abounding in springs, 27 miles wide, bordered on the south by the huge snowy Chamen-tagh range (cf. From Kulja to Lob-nor, p. 82). According to this information, the name Chamen-tagh applies to my 'Tsaidam,' Columbus,' and 'Mosco' ranges taken collectively, and this is supported by Mr. Carey's testimony. Meanwhile our Ulan-gadjir guides distinctly assured us that the range now described (in chap. vii. of Prjevalsky's last work, see Supplementary Papers, R.G.S.), was the Chamen-tagh, and, according to our latest information at Lob-nor, that name applies to the snowy range intervening between Lob-nor and Gass, i.e. the nearest to Altyn-tagh. All this confusion is only another proof of the unreliable nature of hearsay reports; and therefore until the matter is finally cleared up I abandon the names given by me to the ranges in question. Should the name 'Chamen-tagh' afterwards prove to belong to the mountains first spoken of by the Lob-nor people, as now indicated by Mr. Carey, my names 'Mosco,' 'Tsaidam,' and 'Columbus,' may stand as referring to particular parts, for these are separate ridges differing one from the other. And my present Chamen-tagh, i.e. the range which borders the 'Valley of the Winds' on the north, may be called *Nameless*, as I have indeed suggested for its easterly continuation. In any case this is not the Altyn-tagh as shown on Mr. Carey's map."—We may therefore conclude to let the name 'Altyn-tagh' still stand on our maps for the range (or ranges) nearest to Lob-nor, whilst we identify Chamen-tagh with the more southerly situated mountains, preserving Prjevalsky's names in smaller type in special localities.

The Resources of British North Borneo.—The report of Mr. W. B. Pryer, British Consular Agent at Sandakan, in British North Borneo, for the year 1888, has just been published by the Foreign Office (No. 493). He states that, while the imports show a steady increase, the exports remain almost stationary, denoting apparently that the limit of

the capabilities of the forest for yielding wild products, which have hitherto constituted the main bulk of the exports, has been reached, and that any increase in the future must be looked for in the direction of cultivation. Tobacco is the principal article cultivated, and an important industry is springing up in connection with it. Last season, being exceptionally dry, was unfavourable to tobacco, but, although the crop was small, it was of the finest quality, and operations for its cultivation are being rapidly extended. Liberian coffee is being cultivated with marked success, and pepper also. The problem which has to be solved, is not to develop the cultivated products of the country but to find out what plants are best adapted to the soil and climate and can be cultivated with profit. The search* for a payable gold-field, which, it was presumed, must exist, judging from the quantity of drift gold floated down the Segama river, was resumed by Mr. Skertchly, the manager of the company, in May last. The main obstacle hitherto had been the difficulty of ascending the river, which is full of shallows and rapids, and of forwarding supplies of provisions, the country being totally uninhabited. Striking into the forest at a point in Darvel Bay, which was judged to be nearest to the district which was to be reached, Mr. Skertchly crossed three sharp ridges of mountains, and at length struck the higher Segama at a place some 250 miles from its mouth; the track is only 31 miles long, but the rocky nature of the ground caused great difficulties. Gold was found in increasing quantity as the river was ascended, but no reefs were discovered, the gold being almost entirely in the river-bed. Mr. Skertchly spent five and a half months continuously in the forest. Coal has been discovered in the Sandakan Bay district in small quantities, and the search for it is being continued.

Immigration in the Argentine Republic.—Some useful statistics on this subject are contained in a report (No. 123) by Mr. G. Jenner, our Consul at Buenos Ayres, which he has drawn up in connection with some recently compiled tables of immigration. In 1857 the number of immigrants who entered the Republic was 4951; since that time the number has increased year by year, until in 1888 it reached a total of 155,632. It is calculated that this year 200,000 immigrants will land in the country, and also that the population, which is now about 3,500,000, will exceed, at the present rate of increase, 7,000,000 by the end of the century. From a classification of the immigrants according to nationalities, it appears that over 65 per cent. are Italians, about 15 per cent. Spaniards, and 10 per cent. French, so that the Latin races furnish about 90 per cent. of the total. This is not viewed by the Argentine authorities with complete satisfaction, and strenuous efforts are being made to attract northern Europeans.

* 'Proc. R.G.S.,' 1888, p. 798.

The Internal Heat of the Earth.—At the German "Geographentag" held in Berlin in April last, Herr Huyssen, official Director of Mines, gave some interesting data as to the increase of temperature beneath the surface. The boring at Sperenberg, near Berlin, has now reached a depth of 4176 feet, that at Seckenwitz 4390 feet, and that at Schladebach 5735 feet. At Sperenberg, at a depth of 3490 feet, the temperature observed was $107^{\circ}\cdot6$ Fahr.; at Seckenwitz, at a depth of 3555 feet, it was $91^{\circ}\cdot5$; and at Schladebach, at a depth of 5735 feet, it was 134° . The latest observations, Herr Huyssen points out, indicate that as yet no rule as to the ratio of increase with depth has yet been observed; the increase seems to be neither geometrical nor arithmetical, nor indeed according to any fixed rule.

REPORT OF THE EVENING MEETINGS, SESSION 1888-9.

Eleventh Meeting, 13th May, 1889.

General R. STRACHEY, R.E., F.R.S., President, in the Chair.

ELECTIONS.—*Robert Barclay, Esq.; William Wallace Bowman, Esq.; George Broke, Esq.; Caloust S. Gulbenkian, Esq.; G. F. Heyworth, Esq.; Lieut. R. J. H. L. Muckenzie, R.E.; Victor Morier, Esq.; Hon. Louis Lawrence Smith; J. R. Werner, Esq., C.E.*

The paper read was:—

"The Congo and the Ngala and Aruwimi tributaries." By J. R. Werner, Esq. (*Ante*, p. 342.)

The foregoing paper was followed by the discussion on Mr. Stanley's letter, postponed from the Meeting of April 8th.

DISCUSSION ON MR. STANLEY'S LETTER.

After a few words from the President introducing the subject:—

Sir F. DE WINTON, after expressing his regret at being unavoidably prevented from being present at the meeting when Mr. Stanley's letter was read, said that the relief of Emin Pasha had been fully attained. The succour he stood in need of had been conveyed to him; the assurance that he was not forgotten or deserted had been manifested; a new route had been opened up to his province, which might play an important part as regards that portion of Central Africa; and he thought it might safely be left to Emin and Stanley to work out the problems which now surrounded Emin, including the return of his followers, principally Egyptians, and their wives and families, to Egypt. He could assure the Royal Geographical Society that they were in possession of all the information Stanley had sent home to the Committee. Besides the successful accomplishment of the object of the expedition, a large and important increase had been made to geographical science. The river Aruwimi-Ituri had been thoroughly investigated; and its resources, the tribes who inhabited its banks, their manners and customs, their hostility and their friendliness, had been described in that vigorous manner so well known to readers of Mr. Stanley's works. With regard to the poisoned arrows by which some of Mr. Stanley's party

met their death, Dr. R. W. Felkin had written from Edinburgh: "There are many things contained in Mr. Stanley's letter to which I should like to have referred had I been able to be present, but as I can only write, I will only call attention to Mr. Stanley's remarks regarding the poisoned arrows which were used by the Tikki-Tikki in attacking him. I send you herewith two of the arrows which I obtained from them, and which will probably be of interest to the meeting. Mr. Stanley must, however, have been misled as to the origin of the poison, for the poisoned arrows kill within twenty minutes after a person has been wounded, unless the antidote to the poison is used. The deaths which Mr. Stanley records were simply due to tetanus, which so often attacks and proves fatal to persons wounded in tropical countries. Deaths due to Central African arrow poison cannot possibly prove fatal after five or seven days. I am quite aware that red ants contain formic acid, but this acid, although an external irritant, is not a deadly poison, nor can it be found upon the arrows, of which I have a great many in my possession. The poison which is used by the Tikki-Tikki is obtained from a tree which is found both in Central Africa and on the east coast north of Mombasa. I have repeatedly seen men killed by it, and also others recover after the antidote has been administered. The poison is allied to, and acts very much in the same way as, the *strophanthus*, a poison which has been investigated by Prof. Fraser, of Edinburgh, but he finds that the Tikki-Tikki poison is far more active or deadly. Drawings of the arrows referred to will be found in the '*Zeitschrift für Ethnologie*,' vol. xvi. 1884, p. 272. The arrows there depicted I gave to Professor Virchow when he came to the Edinburgh 'Tercentenary.' He (Sir F. deWinton) had no doubt that Dr. Felkin was right, and that Mr. Stanley was also right as far as concerns the facts that came under his observation. The discovery of the Aruwini-Ituri had another important bearing. It might prove to be the best route to the Albert Nyanza, at least for some years to come, because by it there were at least 1400 miles of water carriage, and not more than 500 miles to traverse by land. He did not know of any route from the East Coast offering such advantages. The snow-clad mountain, Ruwenzori, might turn out to be the Gordon-Bennett, though Mr. Stanley, who was the only white man who had seen the two, was of opinion that they were distinct mountains. Mr. Stanley left his camp at Bonalya on September 4th, on his return journey. He had taken 82 days to retrace his steps. He might therefore be reasonably expected to have returned to the Albert Nyanza on or about last Christmas, and as he was aware of the depot of provisions and goods and donkeys for him at Msalala, there appeared to be three possible courses which he might pursue. He believed Mr. Stanley to be thoroughly determined to return via the East Coast. He might strike northward of Uganda, and, skirting that country, reach the Lake Victoria in the neighbourhood of Kavirondo, and then pursue his way by Lake Naivasha and the Ulu Mountains to Mombasa. The East African Company had at this moment a large caravan at or near Lake Naivasha. Or on arriving at the lake he might transport his party to the missionary station of Usambiro and there obtain his stores, and then march by the regular trade route to Zanzibar. Or he might endeavour to reach Msalala and Usambiro by the west side of the lake, a route already partly known to him, and so to Zanzibar. Whichever route might be chosen, it could not fail to add to geographical knowledge. From whatever point of view the expedition might be regarded, whether from the philanthropic and humane endeavour to relieve Emin Pasha, from its aspect of adventurous exploration, or from the additions it would make to the science of geography, it was a subject of deep and earnest congratulation that Stanley and his brave companions had so far succeeded in their enterprise,—a subject of congratulation not only to the promoters of the scheme, and to the Royal Geographical Society, which so wisely

contributed towards the fund necessary for its organisation, but also the British nation and the whole civilised world. In history it would appear as one of the noblest achievements in its object, in its design, and in its execution, that had ever been recorded in the annals of exploration. It was an achievement of which the great British Empire might well be proud.

Sir SAMUEL BAKER expressed his intense admiration for Mr. Stanley, who had shown indomitable energy, pluck, and perseverance, and had succeeded in one of the most difficult enterprises that had ever been undertaken. At the time when Sir Roderick Murchison was the shining light of the Society, the map of Africa was a great blank, and it was never imagined that it would be filled up by the energy of Englishmen. Livingstone first aroused the ambition for African research. Others had left their bones in unknown spots in Africa, and their names had been utterly forgotten. But some were living still who had followed Livingstone's example, such as Burton, who reached the Tanganyika with the lamented Speke; and Grant, who with Speke was sent by the British Government, at the instigation of the Royal Geographical Society. It was that Society which had opened up Africa. Speke and Grant, after very great difficulty, succeeded in reaching the Equator through the Victoria Nyanza regions, and discovered the true source of the river Nile. It was one of the happiest days of his life, when at Gondokoro in 1862, he had the pleasure of meeting Speke and Grant, marching with their rifles on their shoulders, never having bestridden a quadruped the whole way from Zanzibar to Gondokoro. That expedition was the most successful before Stanley's that had ever been undertaken. All that remained to be done then was to verify the existence of the second lake, of which they both had heard. That business was confided to him (Sir S. Baker) by his friend Captain Speke. Before he arrived there, he had spent a long time in examining every one of the Nile tributaries, and had come to the decision that the periodical rise of the Nile was occasioned by the rains in Abyssinia. It was the inundation from the streams of Abyssinia which caused the great rush of waters from July to September. The question, however, was to discover the Muta Nzige. He heard from a female slave that when she was a girl, large vessels used to arrive with Arabs from the south, armed with straight swords. When he first sighted the Albert Nyanza it appeared to him very much, as Stanley described it in his interesting letter, as a vast mirror. But it was now known that in Central Africa changes took place in consequence of the enormous growth of aquatic vegetation. The whole block in the White Nile, which he had to cut through for about 50 miles, was occasioned by the growth of vegetation. When he first saw the Albert Nyanza from an elevation of 1500 ft. it might have been from 25 to 40 miles in width, but towards the south or south-west it was boundless. The mountain which Stanley apparently saw capped with snow, was in his (Sir S. Baker's) original map, now in the possession of the Society, without snow. Stanley also described the lake as very much curtailed, and stated that Emin declared it had fallen to such an extent that former islands had become simple promontories. This change was a matter of enormous importance to Egypt, affecting as it did the requisite inundation of the Nile. When he gave the name of Albert Nyanza to Muta Nzige, the natives informed him that it extended so far to the south that that part was unknown, and on his second expedition two merchants from Zanzibar assured him that they had arrived in boats from M'Pororo. They had no object in deceiving him, and they said they were not going to return that way because the natives were very hostile. Captain Baker, of the Navy, was with him at the time, and they cross-examined the merchants very closely, and from their painful experience of cutting through the *suda*, they came to the conclusion that there must be a stoppage by vegetation in the neck between the two lakes. At that very time Livingstone, in a letter addressed to the President

of the Royal Geographical Society, he being on the Tanganyika, said, "This lake and Baker's lake are all one water." He hoped that Stanley would solve that problem. For the last few years there had been a great irregularity in the rise of the Nile, and last year a scarcity of water which had been unknown there for a century. If the Albert Nyanza had fallen so low that islands had become headlands of the mainland, it was easy to imagine what would be the effect on the water of Lower Egypt. The Victoria Nile, instead of immediately rushing out of the Albert Nyanza with the accumulated water of that great reservoir, would lose its volume by filling up the void occasioned by the subsidence of the lake level of the Albert. In 1861, when he first started, the map of that region was an absolute blank, but it had been rapidly filled up by Speke, Grant, himself, Gordon, Schweinfurth, Junker, and others. At the time when he handed over the administration to Gordon, there were fifteen steamers on the White Nile. He had sent up nine, and built one himself. Gordon built two, and put them on the Albert Nyanza, and those were the steamers which Emin now had. At the end of Gordon's administration there was a telegraphic system, not only up to Khartoum, where day by day at 12 o'clock the register of the river was sent to Cairo, but right up to distant Kordofan and Darfur, also to Fazogli upon the Blue Nile; a civilization had not only taken root, but had borne fruit. All this had been achieved by individual Englishmen, and the natives had learned to depend upon the integrity and truth of Englishmen, because they had only seen individuals of that nation, and had never experienced a British government, which, through a temporary insanity, has abandoned all that had been accomplished in the Soudan.

Colonel GRANT said that when Captain Speke and himself reached Gondokoro, Sir Samuel Baker furnished boats and provisions for themselves and their followers proceeding to Khartoum. No one in England had a greater admiration for Stanley than he had. For hundreds of miles he had cut his way, inch by inch, encountering frightful dangers and risking the poisoned arrows and pitfalls of savages. The native named "Ugarrowa," the greatest slave dealer on the Aruwimi, is not an Arab. He is a pure native, released from slavery by the late General Rigby, our consul at Zanzibar, and therefore he can claim British protection. He was one of Captain Speke's most faithful followers to Egypt, and though he has devastated the Aruwimi region, it should also be remembered that he was the man to whom Stanley entrusted his sick followers, and that Stanley's letters had reached England through him. Stanley had said that not a day passed without rain, and when he (Colonel Grant) was in Uganda, the rain fell daily, like a beautiful sprinkling. That might be supposed to amount to a great number of inches every year, but every day it was so little that the rain gauges could not measure it. Yet, from this small rainfall, the heavy nightly dews, and tropical heat, the luxuriance of vegetation is wonderful, and the fall was calculated at about 48 inches per year; whereas in India there were parts in which the rainfall was 500 inches in the year. When at the Victoria Nyanza, Speke and he were told that there was another lake, far away to the west, named Muta Nzige. There were many reasons why all the different accounts of those who had seen that lake might be strictly accurate. Burton and Speke, who almost circumnavigated Tanganyika, never found any outlet there; but Cameron discovered a magnificent river flowing towards the Congo. Afterwards Stanley found the whole course dried up. He, himself, had seen on the Nile, in November, floating islands probably an acre in extent, with trees upon them, and rank vegetation which had all been produced in one year. If that process were continued the river would become blocked; so that Stanley's statement that no steamer could go within five miles of the south end of the lake, meant that the lake was filling up with the debris of floating vegetation which descends with the river at the south end

of the lake. He believed that Stanley would not return without settling the problem as to the tract of country between Albert Nyanza and Tanganyika.

Mr. J. ROSE TROUP said that the few notes he had to offer for the consideration of the Society related to the stories told to the officers at Yambuya by some deserters from Mr. Stanley's advanced column, with the addition of a few facts gathered from the Arabs during his year's stay at Yambuya. It would be remembered that Mr. Stanley left the camp on the Aruwimi on June 28, 1887. On the 9th of September following, Major Barttelot and he (Mr. Troup) set out to survey the road taken by Mr. Stanley, going as far as his first halting place. They found the road fairly good, with a few small streams, and had no difficulty in tracing the route, as the trees were frequently blazed in places. Once they got a little at fault, owing to his having made a slight *détour* for his donkeys, whilst the column went by the other route, also marked. They passed no less than four rapids, the road being close along the river. The views obtained were very fine. They went as far as a deserted, or rather burnt, village, where, no doubt, Mr. Stanley stopped the first night. Early in October they saw at Yallasullah, on the Congo, five Zanzibaris who had deserted from Stanley's column. These men told them that they were twenty days in a canoe coming down from where they left Mr. Stanley till they reached an Arab encampment about a day's march from Yambuya. They said he had not reached the lakes when they left; food was scarce, he had had trouble with the natives; at one place they fired on the column with bows and arrows. A white man, who, we thought, from their description must be Nelson, got an arrow wound, but was all right again by the time they left.

Towards the end of February, Major Barttelot and Mr. Jameson visited Stanley Falls, leaving him (Mr. Troup) in command of the camp. During their absence he (Mr. Troup) gained the following information. "Nassib bin Seif and another Arab arrived from Abdallah's camp at Opoy. The former brought one of our Remington guns, which his men found in a deserted village near Abdallah's camp. He said the two Zanzibari deserters at Abdallah's were still very sick, having bad ulcers on their feet, and were unable to come down. The two Zanzibaris had stated to him that they left Stanley with five others in a canoe, at a point where there were big rocks in the river standing high up. The river was very broad there, with many large islands. Stanley could not get his boat through, having to take it overland. These seven Zanzibaris got a canoe and came down river, but were upset on the journey; five of them were captured by the natives and eaten, only these two reaching Abdallah's camp. Nassib bin Seif went on to say that these two Zanzibaris state that it took them one moon to come down from where they deserted Stanley at the large rocks to Abdallah's camp, and that it had taken Stanley five moons to reach the large rocks from here. They said the villages up there are as large as Basoko at the mouth of the Aruwimi; that the natives have shown fight sometimes, but often clear out to the other side of the river on the approach of the white man. Food was plentiful at the "Rocks," sugar-cane, Indian corn, and manioc. Stanley had met some Arabs near the Rocks, who had come from Kibonge, south of Stanley Falls, to get ivory, which is plentiful also. Nassib bin Seif states that the Zanzibaris say that Stanley was wounded by an arrow.

The officers at Yambuya were informed afterwards by Salem Mahommed, that the Arabs from Kibonge, whom Stanley was supposed to have met at the Rocks, would only take nine days to go from Kibonge in canoes to the Rocks, while Stanley, by the Zanzibari account, took five moons to reach the Rocks. He also told us that there was a road well known to the Arabs, who were stationed all along it; this route led from near Stanley Falls across country to the Unyoro end of Lake Albert. Though the accounts given by the two sets of deserters from the advance column

did not seem exactly worthy of credence, it was rather remarkable that their story tallied in many details with the course of events, as they have recently been disclosed in Mr. Stanley's letters. The report given by the second party seemed of the greater importance. According to Nassib bin Seif's repetition of their tale, they had left Stanley at a place where there were big rocks in the river and that Stanley was here obliged to carry his boat overland. They had been with Stanley for five moons, and it had taken them one moon to come down the river in a canoe as far as Abdallah's camp, where they arrived in December. This time agreed, as nearly as we could calculate, with the number of months Stanley had been absent up to that date. They said, according to the Arab's account, that Stanley had been wounded, but it is probable that the deserters had only mentioned the wounding of a white man, the same one doubtless that, after the description given by the Yalla-sullah deserters, we had guessed was Nelson; but from Stanley's letters we now know that Stairs was the victim. These deserters spoke of there being plenty of food when they left Stanley, which, according to their five moons, would have been in November. Stanley in his letters says, that after passing through a famine-stricken country, he reached Ibwiri on November 12th, and found abundance there.

According to the Zanzibaris, it was before they reached the "Rocks" that Stanley met the Arabs. From Stanley's letter we learn he met Ugarowa's Manyema men on August 31st, and reached a point opposite Ugarowa's camp on September 16, and did not emerge from the Arab district until November. The deserters said the Arabs were from Kibonge. This place is eight days' canoe voyage above Stanley Falls on the Congo, and is a large village occupied by one of Tippu Tip's sheiks, with Manyema followers under him. It was from near Kibonge we were told by Salem Mahommed, that the Arabs started in canoes to go to the "Rocks" on the Aruwimi. It should be noticed that by Stanley's map the Aruwimi reaches its most southern point not far from the river Lendar. Near Kibonge there is a river coming down in a south-westerly direction, emptying into the Congo. It seems possible that by going up this river, called on Justus Perthes' map Munduku Lulu, and by making some short overland journey the Arabs might reach the Lendar and descend it to the Aruwimi, into which river it empties in the very district said by Stanley to be under Arab control.

It must be remembered that none of us white men had ever seen this second party of deserters, who had been stopped at Abdallah's camp. This Arab Abdallah had followed in Stanley's track as far as a village called Opo, which we were told was about a month's journey from Yambuya. Major Barttelot at one time proposed to visit Opo, but, for certain reasons, he never did so. It would have been well if we had seen these two deserters, as they might have given us some clues that might have proved serviceable, and we might have gained further information while at Opo. At all events, by going to that place we would have at least been able to have familiarised ourselves with that part of the country first traversed by Stanley, and through which we would have to pass when we set out to follow him.

The Rev. HORACE WALLER said the lateness of the hour forbade anything more than the merest glance at some points which had been untouched. For instance, it must have astonished many to notice that whilst Mr. Stanley had sent home a large number of letters and much information, not a scrap of paper had reached Europe from Emin Pasha, as far as people knew. If those were present who could account for this absence of letters from Emin Pasha—himself a most active and admirable writer, with correspondents all over Europe—the Society would be grateful for the explanation. He wished to offer his own tribute to the courage, dash, and perseverance which Mr. Stanley had shown on this, his last and most dangerous enterprise. But there had been a noticeable abstention from any mention of the

chief obstacle which thwarted Stanley—he alluded to the ever increasing devastations of the Arabs who hailed from Zanzibar, and which, in this instance, were chiefly carried on by Ugarowa. This destruction of native life witnessed by Stanley was entirely within the Congo State. He would remind the older members of the Society that, during the last twenty-five years, Interior Africa had been shown to them under three distinct aspects. There was the pure unadulterated savagedom, depicted by Livingstone as the result of his earliest travels—that was the first state. This was followed by the disturbed condition of the people around the lakes, owing to the advance of the Zanzibar Arabs, and we had then the hideous scenes at Nyangwé before us. Following this second phase there came an intense aggravation of all the previous miseries and massacres endured by the tribes. The Congo was discovered, opened, and converted into a great mercantile waterway. These Arabs such as Tippu Tip, who tore Africa to pieces for ivory, had no longer to lead their caravans to the east coast at a great expenditure of money, lives, and time, for an organisation was at work which took a ready market to their very doors. Steamers now conveyed powder, guns, and other goods to the handiest loading places, and tusks were put on board by the Arabs in exchange for the means of doing further mischief. Tippu Tip and some of his kidney could turn over their money twice now, in the time it took them to do it once formerly. He merely wished to add that he had now divided up the recent history of Central Africa as it was known to explorers, showing what had been its first and its latter states: there appeared to be still another stage, which he would call the “Congo State,” and, in his opinion, it promised to be the worst of all.

Rev. Mr. ASHE said that he first went to Africa in consequence of Mr. Stanley's intercourse with King Mteza. He wished to express the great pleasure it was to Mr. Mackay and himself to be the first to receive communications from Emin Pasha, and to be able to help him. Lately, about 300 loads of goods had been stored at M'alala, and when they were in great danger the natives hid them at the top of the rocks. The words spoken by the people whom Stanley encountered—*Kunuwana* the making of peace, and *Kuruwana* the making of war—seemed to be the language of the great pastoral people around the Victoria Nyanza. He agreed that the most likely route for Stanley to take on his return was either by the west of the lake or across the lake and then make his way through Unyamwezi to Zanzibar.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—April 6th, 1889: Baron von RICHTHOFEN in the Chair.—The chairman announced that the “African Society in Germany,” which had from the year 1874 to 1886 contributed so much towards the exploration of Africa, had now been definitely dissolved, and that the small balance of funds still belonging to the Society had been handed over to the Karl Ritter Foundation.—Professor H. KIEPERT laid upon the table his new large map of Asia Minor, which is now complete in manuscript.—Dr. H. LENK spoke upon his geological studies in the highlands of Oaxaca, in Mexico. The speaker confirmed Schleiden's observation that Mount Jorullo, which was regarded by the advocates of the theory of volcanic elevation as a typical example, does not in any way support this theory. The mountainous elevation is nothing but a lava stream covered over with volcanic ashes. On the 19th September, 1888, the traveller stood upon the summit of Popocatepetl,

the crater-walls of which present a perpendicular precipice, and are composed of alternate strata of lava, ashes, and lapilli. The black belts of lava project for the most part, because the loose material of the intervening strata is partly precipitated into the depths below. There is still a fair amount of activity present; in seven places sulphurous gases were escaping with a loud noise. The traveller then made an attempt to ascend the virgin peak of Iztaccihuatl. At an altitude of about 14,000 feet he found a perfect little glacier, which slopes away to the south-west and produces numerous crevasses. The glacier possesses only one kind of terminal moraine, the distance of which from the end of the glacier shows that the glacier is receding. When near the summit, and with success almost within grasp, a heavy snowstorm with mist came on and compelled the party to turn back; the actual summit lay still about 500 feet above them.

—— May 4th, 1889: Dr. VON DEN STEINEN in the Chair.—Dr. H. Meyer addressed the meeting on the subject of Stanley's expedition for the relief of Emin Pasha. He gave an historical review of the progress of the undertaking, and laid stress upon the fact that the best authorities, such as Junker, Wissmann, and Schweinfurth, &c., had never believed in the destruction of the expedition. Passing on to the results of the expedition, Dr. Meyer pointed out that Stanley had over-estimated very considerably the extent and continuity of the primeval forest. He travelled along the valley of the river, which abounded in water and was therefore wooded, but came upon grass-land as soon as ever he left the vicinity of the river. This view is confirmed by a passage in Dr. Junker's report of his journey ('Petermann's Mittheilungen,' Supplementary Part, No. 92, p. 29) where the traveller describes the country on the route from the station of Kubbi to the south by the way of the Bomokandi to Mbelia, Ssanga, and the Nepoko. He says with regard to the forests found there, "there are terrace woods, which on both sides of the river, flowing in the bottom of the valley, clothe the steep sides of the deep valley up to the upper edge, and in many places extend over and beyond. . . . Such tropical forests, lining most of the watercourses, attain often a breadth of from five-eighths to one mile and a quarter. If the ramification of the numerous rivulets be taken into account, it will be seen that the sum total of these terrace woods, although covering but comparatively narrow strips of country, approximates in its effect to extensive tropical forests. An excellent bird's-eye view of the distribution of these conditions is obtained from mountain summits. Seen from the height, the undulating country for a distance of many miles appears to the eye to be everywhere wooded, because the tree tops of the scattered timber of the steppe country, situated between the rivulets, are only seen at a very acute angle." Dr. Meyer points out further that the small packets, found by Stanley, containing powdered ants, probably represent food, because many African tribes eat ants. That the poison used for arrows is prepared from these insects is at least very doubtful. In conclusion, he directed attention to the real objects of the expedition. On the Albert Lake political negotiations have been going on between Emin and Stanley, which have in all probability secured the Egyptian Sudan for England. Dr. Schnitzer will, now as before, remain at his post on behalf of Egypt (i.e. England). It is, he said, a highly significant fact in the situation, that Stanley did not bring back with him to the Congo a single line from Emin for his friends in Europe.—Herr E. Hartert then read a paper upon Upper Assam, where he travelled during last year for the purpose of studying the zoology of the country. He described the powerful impression produced upon the mind by the Brahmaputra in summer, which far surpasses that made by the Niger, which he, as a member of Flegel's expedition, had the opportunity two years ago of studying. The banks are lined with pasture-grounds, and fields of jute,

rice, and sugar-cane, which are separated from each other by well-kept banks and hedges. The atmosphere is hot and humid, the electrical tension great, and the distant mountains are veiled in clouds perpetually. It is quite otherwise in winter. The air is then wonderfully clear; between the watercourses, now completely changed in character but still navigated by numerous paddle-steamers, high sandbanks extend for an apparently immeasurable distance. These sandbanks are inhabited by large birds, by small, long-snouted crocodiles, and by numerous turtles. Beyond the thickly wooded mountains, to the north, tower in the clear distance the snow-clad summits of the Himalaya, still untrodden by the foot of the European. This prospect is especially beautiful above Tezpur. The steamers run regularly up to Dibrugarh; beyond the latter place, eastwards, some small garrisons are situated, and numerous tea-planters have settled. The speaker then described the ruins of the Hindu temple of Tezpur, with regard to which he supposes that they have been conveyed thither from an ancient Tezpur situated further in the interior, and that the work of reconstruction thus begun was abandoned in consequence of wars or want of energy. He described further the ruins of the immense walls round the town of Gauhati, and the temple buildings of Kumaika on the hills behind Gauhati. The present population of Assam is remarkably small, and stands in sharp contrast with the descriptions which the Buddhist pilgrim Hiuen-Tsiang gives in the seventh century A.D. of the mighty Kamrap empire, which is the Assam of to-day. The decline of Assam dates probably from the time of the invasion of the Pathan rulers of Delhi in the fifteenth century, which was rendered necessary at that time in consequence of the inroads of the wild hill tribes of the north, just when the Shan tribes of Akama, from which the present name of Assam is derived, had worked their way up to the position of the ruling class. The most terrible invasion was that of the Burmese under the sovereigns of the Alaung-Paya dynasty, which took place at the end of the last and the commencement of the present century, and which was carried out with such cold-blooded cruelty and recklessness that it caused one of the greatest devastations of a country known to history. In consequence of the extreme fertility of the soil, dense forest has quickly covered the place where a century ago stood luxuriant fields and flourishing villages. The population of the Assam valley is, after all these devastations, not only a very small, but also a very mixed one, and contains but a small percentage of the Aryan elements. The speaker then gave a description of the different wild mountain tribes of Upper Assam: the Miri, whose houses are constructed simply of wicker-work, and rest upon tall piles, resembling the Battak houses of Sumatra; the Khamptis; the Singphos north of the Dihing; the Nagas south of the latter, representatives of whom are frequently met with in the markets of Sadiya, purchasing mostly opium and sweetened rum. Still more uncivilised than these tribes are the Mishmi or Midhi, as they call themselves, who dwell to the north of Sadiya, and from whom also traders arrive in Sadiya at the end of November with the commencement of the dry season. Their territory is not to be traversed, except at considerable expense. West of them dwell the Abor, whom Needham visited for the first time since 1854. The winding curves which the Brahmaputra makes in this region are astonishing. Sadiya appears to be doomed to destruction; it is quite possible that by 1890 Needham's house itself will have fallen a sacrifice to the waters. The stream carries along with it enormous masses of detritus. Every projecting point in the course of the river gives rise to the formation of an island, and it often happens that steamers which are obliged to lie at anchor during the night, are found in the morning with their hinder parts resting upon soil which has accumulated during the night, in consequence of the obstruction caused by the vessel. The shore and river-bed are consequently continually rising, so that the

fertile marsh lands lying behind the banks of the river and below the level of its waters are very much exposed to inundation, as the Great Eastern Railway at Goalanda ten years ago experienced to their cost, in spite of an outlay of 130,000*l.* The low temperature of the Brahmaputra, fed from the glaciers of the Himalaya, is quite striking, and exercises a decided influence upon the climate of Upper Assam. Dibrugarh is considerably cooler than tea plantations situated some miles away from the river. Among the products of Assam, jute plays an important part; it impoverishes the soil to a very large extent, and therefore thrives well only in the most recent alluvial ground. The cocoons of various kinds of *Attacus*, and the silk manufactured therefrom, are also important products. The caterpillar of the *Attacus cynthia* living on *Ricinus communis*, and a large *Saturnia* living on *Artocarpus*, are the most noteworthy. The former are domesticated, the latter live in freedom on the plant which nourishes them. Still the silk of Assam has only a local interest, and is of small consideration as an export. The most important product is tea; Assam being the original home of the plant. A famous place for tea, where tea-plants of great age and considerable size are found, is Bomjur, north of Sadiya. Other important products are coal and petroleum. The coal-fields lie in the south-eastern corner of Upper Assam, near Ledo, in the Patkoi range of hills, which are inhabited by the Naga, and whence a railway runs to Dibrugarh. The coal is burnt on the river steamers. The petroleum deposits are more widely distributed, but they are being energetically worked in the vicinity of Margherita. Assam might, from its ready accessibility from the sea, its fertility, and the continual immigration of labour from the central provinces of India, still have a great future before it.

German Geographical Congress.—The proceedings of the Eighth Congress of German Geographers, which was held in Berlin from 24th to 26th of April, furnished an example of the great activity in exploration displayed by German and Austrian geographers. We extract the following from the results of explorations which were communicated in the various papers read. The Central Commission for the scientific topography of Germany has taken in hand this summer the task of determining by levelling the highest point of Germany. Up to the present time this height has not been known with any degree of accuracy, the figures varying from 9597 feet to 9732 feet! Dr. Eschenhagen, of the Imperial Marine Observatory at Wilhelmshaven, commenced last autumn, under the auspices of the above-mentioned Commission, a magnetic survey of the Harz Mountains, comprising about 3000 measurements, by which he has shown that no connection can be proved to exist between the ancient geological line of fracture of the Harz and the distribution of terrestrial magnetism, such as Naumann demonstrated in the case of Japan. Dr. Eschenhagen has extended his explorations on terrestrial magnetism over the whole of the north-west of Germany, so that, inasmuch as a similar survey of Austria-Hungary by the Academy of Sciences in Vienna will be completed about 1892, our knowledge of the distribution of the force of terrestrial magnetism in Central Europe has made a great advance.—Professor Brückner, of Bern, dealt with the question, which is of eminently practical importance, whether the climate of to-day is constant. It is indubitable that the climate of the tertiary period changed to that of the glacial epoch, which in its turn gave place to that of the present day, but it is a debatable point whether this change is now still going on in the same direction. Whitney and Fisher have considered this question in the light of an increasing desiccation and extension respectively of the desert regions. The proof of local variations of climate being caused by afforestation or disafforestation is often attempted with some success. In general it may be said that meteorologists for the most part hold firmly to the constancy of climate, as an axiom, while geographers, geologists, &c., incline more to the theory of a continual climatic change. With

regard to the periodical variations of climate, it is proved beyond all doubt, since the works of Forell, Richter, and Laug, that glaciers vary periodically; Brückner himself has demonstrated the connection between the fluctuations of the level of the waters of the Caspian, Black Sea, and the Baltic with those of the amount of rainfall in the neighbouring regions, and has shown that the volume of water in the rivers as well as the fluctuations of the glaciers is connected with climatic variations. Although these former demonstrations were only of a qualitative character, Brückner has now extended his investigation over the whole globe, and in connection therewith has availed himself of the material of 600 stations with about 30,000 yearly observations. It follows from this research that the measurements of the amount of rainfall over the whole world show periodical fluctuations in the amount so marked that a general decrease of rainfall can be recognised as having occurred about the year 1860, and a general increase in the year 1880. The decennial periods 1840-50 and 1870-80 were rich in rainfall. Although the periods of maximum and minimum rainfall do not begin exactly simultaneously everywhere, it may be said on the other hand that no minimum period anywhere corresponds to a maximum period at any other spot. The variation of the quantity of rain in the dry and wet periods becomes accentuated towards the interior of continents. In Germany the proportion is about 1:1.09, in Russia 1:1.24, in Western Siberia 1:2.26; in Eastern Siberia 1:1.36. An examination of the observations for temperature showed a similar result, and also the observations of twenty stations in Russia with respect to the duration of the ice-covering of the rivers. The variations of temperature and of amount of rainfall harmonise, so that a moist period corresponds to a cool, and a dry period to a warm one. A similar result is also furnished by the statistics with reference to the commencement of the vine harvest in France, which go back as far as the year 1400. From the year 1670 onwards the curves of variation for thirty stations can be determined. The duration of these periods of variation fluctuates somewhat, but is on an average from thirty-six to thirty-seven years. In the yearly mean the atmospheric pressure is higher over the land than over the ocean, the contrast becoming greater in the dry and warm periods, so that less atmospheric moisture can be conveyed from the sea into the interior of the country. Whatever explains the causes of variations of temperature, throws light at the same time upon the obscurity in which the subject of climatic variations rests. The latter question is of the highest practical importance, inasmuch as variations of climate in the tropics exercise an influence upon the extent of soil capable of cultivation; and in more northerly regions, by diminishing the volume of water in the rivers and by lengthening the period of ice-covering of the rivers, upon trade, commerce, and the well-being of man. Professor Partsch (Breslau) criticised the statements made with reference to continuous climatic changes in the countries lying round the Mediterranean, and came to the conclusion that most of these statements would not stand the test of proof. He declared that the distribution of the most important cultivated plants and domestic animals had not altered to any considerable extent as compared with earlier times, and that where a change had occurred the advent of man had principally caused such change. As a fresh proof of his opinion he adduced the interesting fact that on an old Roman road running through the "Chott" Djerid (the Lake Triton of antiquity), in Tunis, a well showed that at that time this lake basin, which has no discharge, stood no higher than at the present day. Again in the Dead Sea the rise or fall of a few yards in the water-level would have caused great changes; a rise would turn the flat peninsula of El Lisan into an island, and a fall would lay dry the whole of the flat southern portion of the basin, but of such alterations in the configuration of the surface of this basin nothing has ever been reported.

Geographical Society of Paris.—April 5th, 1889: M. MILNE-EDWARDS, of the Institute, in the Chair.—The Society received intimation of the death of M. Aimé Pissis, the geologist, and corresponding member of the Academy of Sciences, whose greatest work, the large map of Chili, secured him the gold medal of the Society in 1873.—Lieutenant Caron wrote informing the Society of the death of his companion and fellow-explorer in Senegal, Lieutenant Davoust.—A letter was read from M. Mich. Venukoff, giving certain interesting items of geographical information. M. Dokutchaeff, Professor at the University of St. Petersburg, and author of an important work on the black earth of Russia, had been pursuing his studies of the various kinds of vegetable earth in Russia, and a valuable collection of specimens thereof would be exhibited by him this year at the Paris Exhibition. Important naphtha wells having been discovered in the northern part of Saghalien, M. Zotov had proceeded thither to explore them in detail. With reference to the scientific expedition to the basin of the Petchora and the Pal-Khoi Mountains, already announced, M. Venukoff stated that the Geographical Society of Russia would be represented on that expedition by one of its members, M. Istomine, whose chief object was to study the ethnography of the country. To the south of the Ural, among the Mugodjares Mountains, MM. Paul Venukoff and Levinson-Lessing, sent out by the Society of Naturalists of St. Petersburg, were to make a topographical survey of the country and explore its mineral riches; while still further south, in the Transcaspian Province, MM. Yatzenko and Zarudny would be shortly pursuing analogous researches. M. Venukoff also announced the recent publication of two works on the geography of these regions, viz. the '*Journaux de voyage du feu Professeur Barbot-de-Marny*' in Turkestan, and the '*Rapports sur l'exploration scientifique de l'Ust-Urt et du Manghychlak*' by M. Andrussov, who was now exploring the eastern part of the Caucasus.—M. Ed. Blanc, in a long communication, returned to the subject of artesian borings in the Sudan, and replied to M. Rolland, who at the previous meeting had criticised some of the former's statements with regard to the exhaustibility of the subterranean water supply in the Ued Rirh. M. Blanc stated that he had only mentioned the latter oasis as an example of his general principle because it was well known, and was quite prepared to admit that the limit of the supply there had not been reached, as this oasis was exceptionally rich in water; he still maintained, however, that new wells could not be bored to an unlimited extent in these oases of the Sahara without affecting the yield of existing ones.—M. L. Savina-Desplaces forwarded some information respecting the state of the new French Protectorate in the Western Sudan. According to news received by him from Cussan, one of the ancient capitals of Bondu, the country had been enjoying perfect tranquillity since the end of the campaign of 1888; the last harvest had been a particularly good one. The ruler of the territory of the Gamon had entered into definite negotiations with the view of being placed under the protectorate of France, while Badon and Kankara had spontaneously requested to be allowed to form part of French Sudan.—The Chairman intimated that M. Henri Coudreau was present at the meeting, having returned to France quite recently, after two years' absence in Guiana in discharge of a mission entrusted to him by the Minister of Public Instruction, in the course of which he had collected a large amount of important geographical and ethnographical information, especially bearing upon the Tumuc-Humac range, and the upper valley of the river Maroni. The Chairman also referred to the successful termination of Captain Binger's mission in the Kong country, the traveller having met with the relief expedition under M. Treich-Laplène, and journeyed with the latter down to the coast. The Chairman stated that arrangements would be made to welcome Captain Binger, who had been decorated by the Government with the cross of the Legion of Honour.—In conclusion, M. Henri Binder read a paper on the Ued Mزاب (Sahara) and its

people. The country is sterile and parched, and it is only by dint of sheer hard work that the people have reclaimed a portion of it. Rain only falls every two years, and then only once on an average. M. Binder gave an interesting description of the manners and customs, &c., of the Mzabites, their dwellings, and mode of government. The Mzabite has great aptitude for commerce, plays the part of the Jew in Algeria, and is detested by the surrounding peoples.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

[**The Carpathians.**—Jahrbuch des Ungarischen Karpathen-Vereines. XVI. Jahrgang, 1889. Igli, 1889.

Among the papers in this volume are the following:—A Winter Tour in the Tatra, by Robert Bartsch; Prehistoric Sites in the County of Liptau, by Josef Mihalik; A Carpathian Journey by Land and Water, by Alois Gebauer; Excursions in the Liptau and Galician Tatra, by Franz Denes. There are besides many smaller contributions to a knowledge of the Carpathians.

[**Finland.**—Fennia, I. Bulletins de la Société de Géographie Finlandaise. Helsingfors, 1889.

The Geographical Society of Finland was formed in the beginning of 1888, and this volume contains a record of its first year's work. Among the papers of general interest are the following:—Researches on the rising of the Coast of Finland in the years 1858-87, by Dr. A. Bohnsdorff; Researches on the Triangulation points situated in Finland, used for the measurement of a degree in Scandinavia, by Denner and Petrelius; On Local Attraction in Viborg, by B. Witkovsky; Glacial period formations in the interior of Finland, by J. J. Sederholm; Astronomical points in Finland; The Composition of the Population of Finland, by Aug. Hjelt; The Dimensions of the Earth in the basis of the Russo-Scandinavian degree measurement, by A. Bohnsdorff.

Fry, Herbert [the late].—London. Illustrated by Twenty Bird's-eye Views of the Principal Streets. Also by a Map showing its chief Suburbs and Environs, and by a Street-map of Central London. London, W. H. Allen & Co., 1889: cr. 8vo., pp. xviii. and 268. Price 2s. [Presented by the Librarian, R.G.S.]

Joanne, Paul.—Collection des Guides-Joanne. Paris. Avec 34 Plans, la Liste des Rues de Paris et un Appendice sur l'Exposition Universelle de 1889, contenant 3 plans. Paris, Hachette et Cie., 1889: 12mo., pp. lix., 384, 39, and 40.

Kips' Guide to Belgium, containing 21 maps and plans of Belgium, Antwerp, Brussels, Bruges, Ghent, Liège, Mons, Namur, Ostend, &c. Compiled and drawn by Joseph Kips, F.R.G.S. [2nd edition.] London, Burns & Oates: 16mo., pp. 48. Price 2s. [Presented by the Author.]

Russia.

Zapiski Voienno-topographicheskago otdiela.—Memoirs of the Military Topographical Department. Parts 42 and 43. St. Petersburg, 1888.

In our February number we noticed part 41 of this publication, and we have now to make the following correction to what we then wrote. Among the reports mentioned we omitted 'Astronomical positions in the province of Akmolinsk by Lieut.-Colonel Schmidt in 1884'; on the other hand, the

positions fixed by M. Skassi in Western China are *not* given, but only the names of the places where observations were taken for latitude and longitude.

Part 42 contains under section 1—Report on geodetical, astronomical, topographical, and cartographical work executed by the corps of military topographers in 1886; and under section 2—Instructions for topographical surveys executed under the direction of the military topographical section of the staff corps on a scale of 1:21,000; Colonel Kuhlberg's abridged report on pendulum observations in the Caucasus; geographical positions of certain points in the province of Akmolinsk (Western Siberia) according to the observations of Lieut.-Colonel Schmidt in 1886; chronometrical expedition in Lapland of Captain Iernesfeldt of the staff corps, by Colonel Bonsdorf; determination by means of telegraphy of the longitudes of Wyborg, Kuopio, and Iohensnu in Finland by Colonel Bonsdorf; polygonometrical network of the city of Tashkend (with a map) by Colonel Pomerantsef; determination by means of telegraphy of the longitudes of important points in European Russia. Part 1 containing the longitudes of the observatories at Mosco, Warsaw, and Nicholaief, and at Rostof on the Don, relative to the meridian of the observatory at Kief (with a map), by Colonel St. Rylke; deviation of the vertical line at Wyborg (with a map), by Lieut.-Colonel Vitkovsky; and, lastly, determination of the measurements of the Earth according to data supplied by the Russo-Scandinavian measurement of a degree.

Part 43 contains the 'Description of the Triangulation of Bulgaria,' by Major-General Lebedeff, lately at the head of this triangulation. This description is divided into five chapters, of which chapter i. gives an historical sketch of the successive development of these trigonometrical works. They date from 1887-8, during and immediately after the last war with Turkey. The network of angles comprises the whole principality of Bulgaria, Eastern Roumelia, and the tract between Constantinople, Adrianople, and the mouth of the Maritsa. This triangulation, based on six positions, has been united with two points common to the great triangulation of Russia, and eleven points on Roumanian territory common to the trigonometrical network of Austria-Hungary. Altogether, the geographical position and altitude of 1274 points have been accurately ascertained, including all inhabited places of any importance, and besides these the highest summits and nine passes in the Balkhan range. The field-work represents 3500 working days and a cost of 100,000 roubles. An explanatory map accompanies this chapter. Chapters ii. to v. give full details of the various observations and calculations connected with this work. Maps, diagrams, and tables follow. Both volumes here noticed are edited by Lieut.-General J. Stebnitsky, chief of the topographical section.

Zapiski Imperatorskago Geographicheskago Obshestva.—Memoirs of the Imperial Russian Geographical Society. Section of Ethnography. Vol. xiii. part 2. St. Petersburg, 1888: pp. 265.

This volume contains the national songs of the district of Gomel in the government of Mohilef, collected and reduced to writing by Zinaida Radchenko. The authoress is not a casual or superficial observer, but has resided continually in the country on the estate of her mother, where she has made a special study of the life of the people, and learned their language, manners, customs, beliefs, and songs. The central position of this locality, between two rival branches of Russian nationality—Little Russians and White Russians—has not failed to impress itself on their folk-lore, and particularly on their songs, for these are a mixture of White Russian with Little and Great Russian, peculiar to the district where they have obtained rights of citizenship. In her introduction Madame Radchenko acquaints us with the life of the inhabitants of Gomel and the characteristics of their songs and style of singing. The authoress, however, is careful not to claim originality for these songs, but considers them for the most part variants of Little Russian nationality with a few from Great Russia in an altered form. Even the pure White Russian songs have undergone some change both in words and mode of singing. A collection of proverbs is given at the end.—[E. D. M.]

Zapiski Imperatorskago Russkago Geographicheskago Obshestva.—Memoirs of the Imperial Russian Geographical Society, Section of General Geography, vol. xix., pp. 413. St. Petersburg, 1888. Edited by J. Mushkétov, with map and 7 plates.

The whole of this volume is devoted to an essay on the history of the development of the flora of the south-eastern part of the Tian Shan by A. N. Krasnof. The author, to whose travels we have alluded in former volumes of the 'Proceedings' (1888, pp. 598, 599; 1887, p. 425), excuses himself in his preface, however, is in our opinion amply justified, for having been charged by the Ministry of Public Instruction with some foreign mission, he availed himself of the opportunity thus afforded him of visiting those parts of Europe which have a similarity with the region of Khan Tengri in the Tian Shan, and of comparing the flora of the Swiss Alps with that of the mountains of Asia. This took him six months, and occasioned delay in the publication of his report. Not the least interesting part of this volume, specially valuable to botanists, are three views reproduced by photography of mountain and lake scenery in the Tian Shan.

Pantussos, N. N.—Svédéniya o Kuldjinskoi raioné.—Information on the Kuldja region. Kazan, 1881: pp. 226.

——— *Voina Mussulman protiv Kitaitsev.*—War of the Mahomedans against the Chinese. Appendices, part 2. Kazan, 1881: pp. 72. Contains songs of the Taranebis, Arabic and Russian text.

——— *Fergana*; according to the memoirs of Sultan Baber. St. Petersburg, 1884: pp. 49.

Rykachef, M.—Cronstadt Anemograph Monro. St. Petersburg, 1889: pp. 124. Contains the tabulated results of recorded observations with Monro's anemograph for 1883-85 (in Russian).

Saltykof, N.—A short pamphlet on the mean Sea-level at Cronstadt (in Russian).

Lidsky, S. A.—Report on a journey in Turkestan and Bokhara in 1887, from the 'Proceedings' of the Society of Naturalists at the University of St. Petersburg (in Russian).

Uslar, Baron, L. K., the late.—Etnographiya Kavkaza. Yazykosnanie iii. Avarskii Yazyk. [Ethnography of the Caucasus—Philology. The Avar Language.] Tiflis, 1889: pp. 242, 275, and 20.

This volume, forming the third of the philological treatises by the same author (see 'Proceedings,' 1888, p. 736), is divided into two sections, the first treating fully of the grammar of the Avar language, the second containing proverbs, tales, songs, and a collection of Avar words. It is hardly necessary to remind our readers that the people whose language is the subject of this book are inhabitants of mountainous Daghestan (Eastern Caucasus). The geographical distribution of their language may be defined on the north by the plains of Kumyk. A line drawn due south 107 miles from the point where the Salak issues from the mountains will hit upon fort Novye Zakaly, where in great contrast with the dusty Kumyk plain, an equally level expanse of green sward delights the eye as the traveller looks down upon Alazan. Within these limits no other language is spoken but that of the Avars.

Beiträge zur Kenntniss des Russischen Reiches und der angrenzenden Länder Asiens. Dritte Folge, Bd. iii. St. Petersburg, 1887: pp. 412, with 6 maps.

This volume contains the reports on the scientific expedition equipped by the Imperial Academy of Sciences of St. Petersburg to the New Siberia Islands and the mainland of Yana. The narratives of Dr. Alexander Bunge and Baron Edward Toll, members of the expedition, are preceded by an historical sketch by Leopold von Schrenck of exploration and discovery in that remote arctic region. We have already noticed this important expedition in our 'Proceedings' (cf. 1888, p. 180; 1887, p. 577).—[E. D. M.]

ASIA.

[**Asia.**—Report on the Geodetical and Topographical Explorations of Russians in Asia at 1888. (From 'Russian Invalide,' April 1889.) [Presented by M. Venukoff.]

Dickson, W. G.—Gleanings from Japan. Edinburgh and London, Blackwood & Sons, 1889: 8vo., pp. x. and 400. Price 16s. [Presented by the Publishers.]

This volume consists of a number of papers or articles on various aspects of life in Japan, ancient and modern. The author has evidently seen a good deal of the country, and made himself familiar with its past. As much of the book consists of accounts of Mr. Dickson's visits to various places, including Fusi-yama, there are many things in it of geographical interest. The book is attractively written.

[**The East.**—Journal of the Straits Branch of the Royal Asiatic Society, No. 19, 1887. Singapore [1889]. London, Trübner & Co.

Among the papers in this number are the following:—Report of a Journey from Tuaran to Kiari and ascent of Kinabalu Mountain, by R. M. Little; Pulau Lang Kawi (two islands 70 miles north of Penang), by W. E. Maxwell, c.m.g.; The Negri Sembilan, their Origin and Constitution, by Hon. Martin Lister; Exploring Expedition from Selama, Pérak, to Pong Patani, by Arthur T. Dew.

[**India.**—Epigraphia Indica and Record of the Archæological Survey of India. Edited by Jas. Burgess, LL.D., C.I.E. Parts I. and II. Calcutta, &c., 1888-89: 4to., plates. [Presented by the India Office.]

—General Report on the Operations of the Survey of India Department administered under the Government of India during 1887-88. Prepared under the direction of Colonel H. R. Thuillier, a.e., Surveyor-General of India. Calcutta, 1889: folio, pp. v., 100, and cxxii., maps and plates.

Izvestija Vostochno-Sibirskago otdiela Imperatorskago Russkago geographicheskago obshchestva.—Proceedings of the East Siberian Section of the Imperial Russian Geographical Society, vol. xix. No. 5, pp. 100, and vol. xx. No. 1, pp. 102. Irkutsk, 1889.

The first of these numbers contains the following articles;—N. N. Saburof, on Baikal salmon (*Coregonus omul* Pall.) and the fisheries in this lake; V. K. Zlatkofsky, Geological inquiries in the Government of Irkutsk; a short notice on a recent attempt to open up communications by the Arctic Sea with Siberia; M. V. Pikhtin, Tabular statement of the fur fair at Yakutsk in 1888, which gives a total of 392,570 rubles (about 40,000*l.*) as the value of all the furs brought to Yakutsk that year; a translation of Lieutenant Younghusband's journey from Peking to Kashmir, besides minor notices and reports.

The second number contains the following:—N. I. Wittkofsky—On the traces of the stone age in the valley of the Angara (to be continued); and A. D. Klements—Preliminary report on an excursion to the districts of Achinsk and Kansk, treating of the geology, archæology, and ethnography of this region.—[E. D. M.]

[**Japan.**—A Concise Dictionary of the Principal Roads, Chief Towns, and Villages of Japan, with Population, Post Offices, &c.; together with lists of Ken, Kuni, Kōri, and Railways. Compiled from Official Documents by W. N. Whitney, M.D., Interpreter of the U.S. Legation, Tōkiyō. London, Trübner & Co., 1889: 8vo., pp. v. and 148. [Presented by Dr. Whitney.]

Extremely condensed as this dictionary is, it is evidently the result of a vast amount of painstaking and research on the part of Dr. Whitney, and will prove of great utility as a book of reference on Japan.

Trübner's Oriental Series.—Miscellaneous papers relating to, Indo-China. Reprinted for the Straits Branch of the Royal Asiatic Society. London,

Trübner & Co. [First Series], 1886: 2 vols. 8vo., pp. xii., 318, and 311, maps and illustrations. Price 21s. Second Series, 1887: 2 vols. 8vo., pp. viii., 307, and 313, maps and illustrations. Price 25s. [Edited by R. Rost.]

A reprint from Dalrymple's 'Oriental Repertory,' 'Asiatic Researches,' 'Malayan Miscellanies,' 'Journals' of the Asiatic of Bengal, Royal Asiatic, and Royal Geographical Societies, and 'Transactions' and 'Journals' of the Asiatic Society of Batavia, giving much that is useful for reference in regard to what is known as the "Far East." The papers of most interest are, "Some account of the elastic gum-vine of Prince of Wales Island," by James Hewison, Esq., the author having been the first to discover and describe *Urceola elastica*, a plant of rapidly increasing importance in the indiarubber trade; "Succinct review of the observations of the tides in the Indian Archipelago," containing most valuable information for navigators in that group, and the first indication that in the Far East the night tides are the highest, the contrary obtaining with us; "Account of the Mantas," by the Rev. Father Borie; "Account of the Island of Bali," by Dr. R. Friederich; and "Descriptions of Malayan Plants," by Dr. W. Jack, containing some valuable notes by Sir Joseph Hooker and the Hon. D. F. A. Hervey.

In future series it would be desirable to bring the various subjects treated of somewhat more on to a level with our present knowledge.

AFRICA.

Crouch, Archer P.—Glimpses of Feverland; or a Cruise in West African Waters. London, Sampson Low & Co., 1889: cr. 8vo., pp. xi. and 323, map. Price 6s. [Presented by the Publishers.]

In his previous volume, 'On a Surf-bound Coast,' noticed in the 'Proceedings' for 1887, at p. 780, the author narrated his first three months' experiences in connection with the laying of a cable on the West Coast of Africa. The present volume deals with the laying of the final section from the Island of St. Thomé to the town of St. Paul de Loanda, with incidental notices of places on the coast of the Bight of Benin.

Harar. Forschungen nach den Somal- und Galla-Ländern Ost-Afrika's. Von Dr. Philipp Paulitschke. Leipzig, Brockhaus, 1888; 8vo., pp. ix. and 557. [Presented by the Author.]

Dr. Paulitschke's trip to Harar in 1885 has been more fertile in geographical and scientific results than many an expedition far more ambitious in its scope. This is due, in a large measure, to the author's geographical training, and the pains he took to fully inform himself as to the region which he was about to explore, before he started. He thus knew the task that awaited him, concentrated his attention upon those points which required elucidation, and avoided the perpetuation of errors, corrected ever and again, and yet constantly repeated by less cautious explorers and travellers. The record of his travels is in several respects a model of what a work of this kind should be. In the narrative section, which fills the bulk of the volume, he supplies a most readable account of the incidents of his journey, of the scenery, and of the people he met with. Strictly scientific matters are relegated to an appendix, excepting anthropology, which the author has already fully dealt with in a work noticed in the 'Proceedings.'

This appendix contains a report on astronomical and magnetical observations; a meteorological journal, partly by Captain J. Stuart King and Lieut. Peyton; accounts of the natural history collections; linguistic notes; and abstracts of two interesting 16th century manuscripts dealing with the history of Hamr. Dr. Paulitschke heard of two other manuscripts, apparently of far higher interest than those of which he was able to procure copies. A copy of one of these is said to have been forwarded by Major Hunter to the Foreign Office, whilst the other, which renders an account of the deeds of Mohammed Granye, the "Attila of Africa," is supposed to have found its way to Cairo.

Dr. Paulitschke's work is illustrated by an excellent map, and furnished with a good index.—[E. G. R.]

Thomson, Joseph.—*Travels in the Atlas and Southern Morocco. A Narrative of Exploration.* London, G. Philip & Son, 1889: 8vo., pp. xviii. and 488. Price 9s. [Presented by the Author.]

Although Mr. Thomson's paper in the January number of the 'Proceedings' will have given some idea of the work which he accomplished in Morocco during his journey last year, it is necessarily partial and inadequate. Those desirous of learning further about the journey must read the present volume, which is written with marked attractiveness of style. It shows that Mr. Thomson accomplished much more than was evident from his paper. The first three chapters are devoted to Tangiers, of the characteristics of which and of its population they afford a graphic and instructive picture. The next four chapters deal with the journey to Agames and Mogador, and here we find an equally satisfactory account of Mogador and its people. We are then taken on through Shiedma to Saffi, and the City of Morocco. This last-named city, both here and in subsequent chapters, is treated in great detail, and Mr. Thomson's observant eye and graphic pen have been able to add much to what we knew already of this interesting city. It was here that the real difficulties of the journey began. Mr. Thomson's great object was to explore the Atlas Mountains and the plateau to the south; and the great object of the Morocco officials was to prevent him from doing so. Much of the book therefore consists of an account of the generally successful attempts of Mr. Thomson and his companion, Mr. Harold Crichton-Browne, to evade and thwart the Kaid and Sheiks, and overcome the obstructiveness and fears of their escort and porters. In spite of all obstacles, Mr. Thomson was able to see much of the country in the neighbourhood of Demnat, Tasimset, Teluet, Amsmiz, and other places; to cross the Atlas at three different places; to climb several summits, one over 13,000 feet; to mark the true nature of the country on the south, where he found no Anti-Atlas; to gather many notes as to the people; and to add substantially to our knowledge of the geology of the mountains. One point Mr. Thomson seems to have proved, that glaciation in the past has not been nearly so extensive as previous writers have tried to make out. The few notes which he gives on the scanty botany of the higher Atlas are suggestive. Of special interest is his chapter on the Jews of Morocco, and the numerous details concerning the same people scattered throughout the volume. To most readers Mr. Thomson's information concerning the Morocco Jews will be new and startling; and his well-considered remarks on the political and social condition of the country generally deserve serious attention. The seventy illustrations are a valuable addition to the book, but the two maps are not so satisfactory as they might have been.

Traub, Paul.—*Voyage au Pays des Bogos et dans les Provinces Septentrionales de l'Abyssinie.* Bulletin de la Société Neuchateloise de Géographie, tome iv. 1888, pp. 96-191.

Although the journey here recorded from an unpublished manuscript by the late Paul Traub was made twelve years ago, there is much in it deserving the attention of those interested in the countries referred to.

AMERICA.

[**America.**]—*Narrative and Critical History of America.* Vol. i. *Aboriginal America.* Edited by Justin Winsor. London, Sampson Low & Co., 1889: imp. 8vo., pp. xxxvii. and 470. Price 30s.

For various reasons this first volume has been delayed until after the publication of the six succeeding volumes. The introduction consists of two parts by the editor.—I. *Americana in libraries and bibliographies*; II. *early descriptions of America, and collective accounts of the early voyages thereto.* Chapter i. deals with the geographical knowledge of the Ancients considered in relation to the discovery of America, by Mr. W. H. Tillinghast; chapter ii.

with Pre-Columbian explorations, by Mr. Justin Winsor, with a special section on the cartography of Greenland; chapter iii. Mexico and Central America by Mr. Winsor; chapter iv. on the Inca civilisation of Peru, by Mr. Clements R. Markham; chapter v. the Red Indian of North America in contact with the French and English, by Dr. George E. Ellis; chapter vi. the prehistoric archaeology of North America, by Mr. H. W. Haynes; with a special section on the progress of opinion respecting the origin and antiquity of man in America, by Mr. Winsor. There are the usual critical essays, notes, &c., and an appendix dealing with a variety of interesting topics, by Mr. Winsor. There is a plenitude of illustrations and maps.

Eves, C. Washington.—*The West Indies.* Published under the auspices of the Royal Colonial Institute. London, Sampson Low & Co., 1889: 8vo., pp. xxiv. and 322. Price 7s. 6d. [Presented by the Author.]

This may be regarded as a sort of general handbook to the West Indies, British and foreign, and includes Guiana and British Honduras. Mr. Eves has brought together from various quarters a variety of information concerning these islands, which makes his work useful as a general book of reference. It is well supplied with maps and illustrations.

[**Regina District, Assiniboia.**—A few facts respecting the Regina District in the great grain growing and stock raising province of Assiniboia, North-West Territories, Canada. Published by the Regina Board of Trade, 1889: 8vo., pp. 40, map.

AUSTRALASIA.

[**Australasia.**—*Proceedings and Transactions of the Queensland Branch of the Royal Geographical Society of Australasia.* 3rd Session, 1887-8, vol. iii. part 2. Brisbane, 1889: pp. 53-123.

There are several useful papers in this number. Mr P. N. Springal gives an account of a recent trip which he made through the Hot Springs district of New Zealand. There are two papers on New Guinea; one, by Captain J. M. Hennessy, gives a report of a trip which he made to the west part of the south coast of British New Guinea; and the other by Mr. E. G. Edelfelt, containing notes of a visit which he made in company with the Roman Catholic missionaries to the Mekeo district in the Mount Yule locality, and also of a journey up the river named St. Joseph by the Catholic missionaries. Probably the most interesting paper is a detailed account of a visit to New Ireland by Mr. Douglas Rannie.

Westgarth, William.—*Half a century of Australasian Progress; a Personal Retrospect.* London, Sampson Low & Co., 1889: 8vo., pp. xxxii. and 423, maps. Price 12s. [Presented by the Publishers.]

Mr. Westgarth has made four visits to Australia, the first was in 1840, and the last, from which he has just returned, in 1888. It is with this last visit that Part I. of this volume deals. The Second Part consists of a series of articles on general questions relating to Australasia, the Colonies, and the Empire generally.

GENERAL.

Bonsdorff, A.—*Zur Bestimmung der Constanten des Erdsilpoids aus Gradmessungen.* St. Pétersbourg, 1888: 8vo. [Presented by M. Venukoff.]

Cecil, Evelyn, B.A.—*Notes of my journey round the World.* With fifteen full-page illustrations. London, Longmans, Green & Co., 1889: 8vo., pp. viii. and 207. Price 12s. 6d. [Presented by the Publishers.]

This is the latest addition to the increasing list of journeys round the World; but the voyage having been taken in the opposite direction to that usually adopted by tourists, there is a certain amount of novelty in it; and as the narrative is very pleasantly written it deserves perusal. The

journey extended through Canada, the United States, Japan, Canton, Hong Kong, Singapore, Java, Ceylon, India, and Egypt, and a great deal has been noted of an interesting nature. Financiers will look puzzled at the deficit in Indian revenue being attributed to "the deterioration of the rupee," and at the author's confusing "pies" with "pice"; and geographers at his reversing the right and left banks of the river at Calcutta. Anglo-Indians may feel alarmed on learning that "*wild tigers and leopards roam about the hills*" near Jaipur; while botanists will wonder at being told that, "The coffee looks like, and is, a dark species of laurel." The illustrations, which are taken from photographs, are extremely beautiful, and greatly add to the interest of the book.

[**The 'Challenger' Voyage.**—Report on the Scientific Results of the Voyage of H.M.S. *Challenger* during the years 1873–76, &c. Zoology. Vol. xxx., Text and Plates, and vol. xxxi. London, Eyre & Spottiswoode, 1889: 4to., pp. (vol. xxx.) xlii. and 893; (vol. xxxi.) lxxii., 314, 47, and 41. Price (vol. xxx.) (with volume of plates) 4l. 10s.; vol. xxxi. 40s. [Presented by the Lords Commissioners of Her Majesty's Treasury.]

[**Dunes.**—Les Dunes. Réfutation des théories de M. Bouthillier de Beaumont, par T. Zobrest. "Bulletin de la Société Neuchateloise de Géographie," tome iv., 1888, pp. 17–35.

M. Zobrest here defends in detail the generally accepted theory of the formation of sand-dunes against the attack of M. De Beaumont.

Gaffarel, Paul.—Les Colonies Françaises. Quatrième édition. Paris, F. Alcan, 1888: 8vo., pp. ii. and 479.

Meiklejohn, J. M. D.—A New Geography on the Comparative Method, with Maps and Diagrams. London, 1889: 8vo., pp. l. and 492. [Presented by the Author.]

In this new geography Professor Meiklejohn, as he states in his preface, has employed the comparative method throughout, "the unknown being constantly referred to and compared with that which is known." "The memory has been assisted, whenever it was possible, by grouping, by connection, and by association; and I have done what I could to inform the subject through and through with thinking." The author has endeavoured to base his political geography on physical geography, and considerable space is devoted to commercial data. Maps and diagrams are largely introduced with great advantage. The first 50 pages are devoted to general notions in astronomical, mathematical, physical, and political geography. The rest of the book deals with the special geography of the continents and separate countries, certain features of different regions being compared frequently in a tabular form. The last few pages are occupied with statistical tables, instructions in map-drawing, and a vocabulary.

Montefiore, Arthur [F.R.G.S.]—Henry M. Stanley, the African Explorer. London, S. W. Partridge & Co. [1889]: cr. 8vo., pp. 160, maps and illustrations. Price 1s. 6d. [Presented by the Author.]

A sketch of the life and principal achievements of H. M. Stanley.

Navigation and Nautical Astronomy.—A Complete Epitome of Practical Navigation and Nautical Astronomy, by J. W. Norie. New edition by W. H. Rosser. London, Norie & Wilson, 1889: 8vo., pp. 932. Price 16s. [Presented by the Editor.]

Norie's Complete Epitome of Navigation has for a long time held its own in the Mercantile Marine. Of late years, however, such works as 'Rosser's Navigation,' 'Wrinkles in Navigation,' and Raper's well-known work on the same subject have come into general use and have rendered it necessary that an entirely new and enlarged edition of "Norie" should be published, unless the

proprietors were willing that it should be regarded as a book that had in its time done good service, but was no longer up to the requirements of the present day. Acting on some such conviction, the services of Mr. W. H. Rosser were engaged by the proprietors, the consequence being that the present edition is a thoroughly useful and practical work.

To bring about this result many additions and alterations have been made in that part relating to navigation, especially in relation to the compass, and the corrections of courses. The portion relating to Nautical Astronomy is quite new, and the tables have been much improved. In editing this work Mr. Rosser has brought to bear his large experience as an instructor; he has wisely abstained from theory, and by the simplicity of his explanations in combination with numerous examples, in which all possible cases are illustrated, has succeeded in producing a really practical work for sea-going purposes.—[J. C.]

Zehden, [Dr.] Carl.—Commercial Geography: based on the latest researches and statistical returns. A complete manual of the countries of the world, their chief centres of trade and means of communication, their mutual productions, mineral resources, exports, manufactures, &c. Translated by Findley Muirhead, M.A., from the 5th German edition; revised for translation by the Author. London, Blackie & Son, 1889: 8vo., pp. viii. and 600. Price 7s. 6d. [Presented by the Publishers.]

Dr. Zehden's commercial geography is well known in Germany and Austria, and in the hands of a well-informed teacher, like Dr. Zehden himself and many others to be found on the Continent, the work is likely to be useful as a series of notes to be expanded by teacher and pupil. In the translation the section of Great Britain has been expanded, and other modifications have been made. The book contains much useful information, and in the hands of competent teachers may prove servicable. There is much general geography in the book, and the commercial information given is often meagre. The arrangement is purely geographical. The utility of such lists as those on pp. 77 *et seq.* of counties and chief towns is doubtful. In a second edition several statements will require revision. The Nile is not navigable for steamers and sailing vessels as far as the Great Lake, nor the Niger as far as 14° N. Tibet is credited with only 1½ inch of rain and Mongolia with 6 inches, while in the latter arable land is said to abound. What has the fact that there are 2700 brooks and rivulets in Switzerland to do with commerce? Might it not have been better to have written an entirely new book for English students from original sources?

The following works have also been added to the Library:—

Moss, [Dr.] Edward L.—Shores of the Polar Sea: a Narrative of the Arctic Expedition of 1875-6. Illustrated by sixteen chromo-lithographs and numerous engravings from drawings made on the spot by the author. London, Marcus Ward and Co., 1878: large folio, pp. 83. [Presented by C. R. Markham, Esq., C.B., F.R.S.]

Katalog der Commerz-Bibliothek in Hamburg, 1864; Erste Fortsetzung, 1864-1867; Zweite Fortsetzung, 1868-1871; Dritte Fortsetzung, 1872-1878; Vierte Fortsetzung, 1879-1885. Hamburg, [1864]-1886, 8vo.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

WORLD.

Pacific and Atlantic Oceans, Bathymetric Map of the —. Mercator's projection. Equatorial scale 20° to an inch. *Am. Jour. Sci.*, vol. xxxvii. 1889, plate vii. (*Dulau.*)

EUROPE.

England.—Map showing the Drainage of the Fenland. Scale 1:253,000 or 3·47 geographical miles to an inch. L. Gibbs, 1888.

—— Map showing the Low Lands draining through the Trent. Scale 1:253,000 or 3·47 geographical miles to an inch. L. Gibbs, 1888.

These are neatly executed maps on which are indicated by symbols the different systems and areas of drainage. The levels in connection with the Ordnance Survey datum are given, and the courses of rivers have been correctly laid down.

Europa.—Neue Karte von —, nebst Nordafrika, Ägypten, Syrien, Kleinasien, Kaukasien, dem ganzen Mittelländ. Meer, Schwarzen Meer, &c. In deutscher, französischer und englischer Nomenklatur. 1:300,000, or 4·1 geographical miles to an inch. 6 sheets. Stuttgart, Julius Maier. Price 8s. (*Dulau.*)

Rügen.—Karte der Insel —, von W. Liebenow. Scale 1:125,000 or 1·7 geographical miles to an inch. Berlin, Albert Goldschmidt. Price 1s. (*Dulau.*)

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Schweiz.—Neue Karte der —, von R. Leuzinger. Scale 1:400,000 or 5·5 geographical miles to an inch. Bern, Schmid, Francke & Co. Price 4s. (*Dulau.*)

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ASIA.

Indian Government Surveys:—

Indian Atlas: Quarter Sheets: 39 S.E. Parts of Districts Sholapur, Ahmednagar, Poona and Satara (Bombay Presidency), and Naldurg (Nizam's Dominion). 114 S.E. Parts of Districts Midnapore and Balasore (Bengal), Singbhoon (Chota Nagpore), and of Native State Mayurbhaya (Orissa). 1888.—India, showing percentage of area under Wheat cultivation. 64 miles to an inch. 2 sheets. 1888.—India, showing percentage of area under Indigo cultivation. 64 miles to an inch. 2 sheets. 1888. Punjab Survey. 1 inch to a mile. Season 1886–87. No. 313 (Preliminary Edition). District Umballa, No. 336 (Preliminary Edition). Districts Umballa and Kalsia State.—Oudh Revenue Survey. 1 inch to a mile, No. 102, Districts Hardoi, Sitapur, and Kheri. Seasons 1863 to 65.—North-west Provinces Survey. 1 inch to a mile. Sheet 196, Districts Ghazipur and Benares. Seasons 1879 to 84. Sheet No. 210, Districts Ghazipur and Ballia (with overlap in District Shahabad of Bengal). Seasons 1879 to 82.—Lower Burma Survey. 1 inch to a mile. No. 143, District Bassein. Season 1880–81. No. 231, Districts Henzada Tharrawaddy and Hantawaddy. Seasons 1880 to 84. No. 233, District Hantawaddy. Season 1882–83.—South-east Trans-Frontier. 4 miles to an inch. Seasons 1885 to 87. Sheets Nos. 1 S.E., 1 N.E., 4 S.W., 5 N.W., 5 S.W., 6 N.W. (second editions), Upper Burma.—North-Eastern Trans-Frontier. 4 miles

to an inch. Sheet No. 15 (second edition), Parts of Assam and Upper Burma. Seasons 1881-82 and 1886-87.—Sketch-map of the Provinces of Bengal, Behar, Orissa, and Chota-Nagpore, under the jurisdiction of the Lieut.-Governor of Bengal, 1887. 16 miles to an inch. 1887. 2 sheets.—District Moorshedabad, Lower Provinces, Bengal. Seasons 1852-55; corrections to November 1887. 4 miles to an inch.—Jeypore. 8 miles to an inch. 1888.—Preliminary Map of a portion of the Chittagong Hill Tracts. Season 1872-73. 4 miles to an inch.—Country adjoining the Chittagong Hill Tracts embracing the Field of the Operations of the Right Column Lushai Expeditionary Force. 1871-72. 4 miles to an inch.—Lushai and adjoining Hill Tracts. 8 miles to an inch. 1889. Skeleton Map of District Akyab. 1853 to 61. 8 miles to an inch.

Persarum et Macedonum.—Imperia —, in usum scholarum descripta ab Henrico Kiepert. Scale 1:3,000,000 or 41·6 geographical miles to an inch. Berolini edidit Ditericus Reimer 1889. 6 sheets. Price 9s. (*Dulau.*)

This is one of Dr. Kiepert's series of historical maps; it is clearly drawn, and well suited to the purpose for which it has been published.

AFRICA.

Afrika.—Generalkarte von —. Bearbeitet und gezeichnet von F. Handtke. Nach den neuesten Materialien ergänzt im kartographischen Institut der Verlagshandlung. Scale 1:14,500,000 or 198 geographical miles to an inch. Glogau, Verlag von Carl Flemming. 28 Auflage, 1889. Price 1s. (*Dulau.*)

Central Africa.—Map of —, illustrating the journeys of H. M. Stanley in the Emin Pasha Relief Expedition, containing the positions named in his recent letter. The possessions of the British East Africa Company, &c. Scale 1:8,420,000 or 115·6 geographical miles to an inch. W. & A. K. Johnston, Edinburgh and London. Price 1s.

This map has been prepared principally for the use of newspaper readers. Stanley's recent journey from Yambuya to Kavalli is laid down, the boundaries which mark the "spheres of influence" of the different European nations are clearly shown, and names of places of importance have been underlined with red.

Central-Afrika.—Originalkarte von Dr. W. Junker's Forschungen in —, in den Jahren 1877/78 und 1880 bis 1885. Nach den Tagebüchern, Kartenskizzen und mündlichen Mitteilungen Dr. Junker's, sowie nach allen vorhandenen Quellen entworfen u. gezeichnet von Dr. Bruno Hassenstein. Scale 1:750,000 or 10·3 geographical miles to an inch. 4 sheets. Petermann's 'Geographische Mitteilungen,' Ergänzungsheft No. 92 und 93. Gotha, Justus Perthes, 1888-89. (*Dulau.*)

South Africa.—Wyld's Eastern —, from the River Limpopo to Algoa Bay, embracing the Transvaal, Bechuana Land, Stella Land, Orange Free State, Natal, Zulu and Griqua-Land West; showing the British Settlements and Native Locations. Scale 1:1,742,000 or 23·8 geographical miles to an inch. London, James Wyld, 1889.

Stanley's Expedition, 1887 u. 1888.—Übersichts-skizze von —. Scale 1:5,000,000 or 66·6 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1889, Taf. 7. Gotha, Justus Perthes. (*Dulau.*)

Witwatersrandt Gold Field and District (Transvaal).—Wyld's New Map of —. Showing the Main and other Reefs, with the Farms, Gold Mining Company's Claims and Concessions. From information in the Surveyor-General's Department. Scale 7477 feet to an inch. London, J. Wyld. Fourth edition, 1889.

AMERICA.

Argentine Republic.—Diagram map of the Railway System of the ———. Superimposed on a map of Great Britain, &c., so as to show relative lengths and positions. Supplement to the South American Journal, July 14th, 1888. South American Journal Office, London.

Guiana.—Kaart van ———. Engelsch, Nederlandsch en Fransch. Naar de beste bronnen en eigen opnemingen geteekend in 1888 door W. L. Loth, Gouvernements-Landmeter in Suriname. Scale 1 : 1,000,000 or 13·6 geographical miles to an inch. Uitgegeven met Geodkeuring van Zijne Excellentie Mr. H. J. Smidt, Gouverneur der Kolonie Suriname. Amsterdam, J. H. de Bussey, 1889. (*Dulau.*)

This map contains all the latest information with regard to Guiana. The boundaries as claimed by the British and Venezuelan Governments are clearly laid down. The positions where gold is believed to exist are indicated, from which it will be seen that by far the greater quantity is supposed to be in French Guiana, and the least in British, which is indeed represented as being entirely devoid of auriferous deposits, except in the case of the region now in dispute with the Government of Venezuela. Much, however, of this information is misleading, as though gold may be found in the places indicated, there is no reason for believing it to exist in sufficient quantity to pay for its extraction in anything like the large areas represented on this map.

Plans of Georgetown, Paramaribo, and Cayenne are given as insets, and telegraph lines are indicated. The map is neatly drawn, and is on a sufficiently large scale to be useful for the purposes of general reference.

OCEANIA.

Australien.—General-Karte von ———, und der Südsee. Bearbeitet und gezeichnet von F. Handtke. Nach den neuesten Materialien ergänzt im kartographischen Institut der Verlagshandlung. Scale 1 : 20,000,000 or 274 geographical miles to an inch. Glogau, Verlag von Carl Flemming. 15 Auflage, 1889. Price 1s. (*Dulau.*)

Samoa-Inseln.—Spezial-Karte der ———. Mit Plänen der Häfen von Apia und Saluafata. Nach den neuesten Materialien bearbeitet von Otto Herkt. Scale 1 : 850,000 or 11·7 geographical miles to an inch. 2 Auflage. Glogau, Verlag von Carl Flemming. Price 6d. (*Dulau.*)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in March and April 1889.

No.	Inches.			
1222	m	=	5·0	Spain, east coast :—Mataró, Masno, 1s. 6d.
319	m	=	6·0	North America, river St. Lawrence :—Quebec harbour, 2s. 6d.
197	m	=	3·0	West Indies, St. Lucia island :—Marigot harbour to Pointe du Cap, 2s.
1099	{ m	=	4·0	West Indies, St. Lucia island :—Vieux Fort bay, Grand Cul de Sac bay. Marigot harbour, 1s. 6d.
	{ m	=	9·0	
	{ m	=	15·0	
1303	m	=	1·0	South America, west coast :—Approaches to Lota and Coronel, 2s.

No.		Inches.	
1924	m =	various	North America, west coast :—Anchorage on the coast of Lower California. Lagoon head anchorage. Rosario bay and Sacramento reef. San Quentin bay. Colnett Bay, 1s. 6d.
1310	m =	1·5	Africa, east coast :—South-west coast of Pemba island, 1s. 6d.
2134	$\left\{ \begin{array}{l} m = \\ m = \end{array} \right.$	$\left\{ \begin{array}{l} 2·3 \\ 4·0 \end{array} \right.$	Borneo, north-west coast :—Muara harbour and approaches to Bruni river. The outer anchorage and Muara bar, 2s. 6d.
1243	m =	1·0	Sulu archipelago, Tawi Tawi group :—Bongas anchorage, 1s. 6d.
1264	m =	various	South Pacific, Cook islands :—Aitutaki island. Hervey isles. Rarotonga island. Avarua and Avatui harbours, 1s.
2041	Singapore to Timooan island :—Plan added, Entrance to Pahang river.		
2454	Luzon island :—Plans added, Port of Dimalansan. Port of Bicobian.		
2192	Saghalin island :—New plan, Karsakovsk roads.		

(J. D. Potter, Agent.)

CHARTS CANCELLED.

No.		Cancelled by	No.
1350	Plan of Mataro road, on this sheet	New plan, Mataro on	1222
319	Quebec harbour	New plan, Quebec harbour	319
197	Marigot harbour to Gros island ..	New plan, Marigot harbour to Pointe du Cap	197
1099	Vieux Fort bay	New plan, Vieux Fort bay on ..	1099
1303	Santa Maria island, Lebu river ..	New chart, Approaches to Lota and Coronel	1303
1924	Anchorage on the coast of Lower California	New plans, Anchorages on the coast of Lower California ..	1924
2134	Brunei river entrance	New plan, Muara harbour and approaches to Bruni river ..	2134

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 1182. England, west coast :—Cardiff and Barry roads with approaches. 1951. England, west coast :—Liverpool bay. 2232. Black Sea :—Odessa to Sevastopol. 603. Black Sea :—Cape Fontana to Tendra peninsula. 1162. Mediterranean :—Sfax roadstead. 2060. North Atlantic Ocean :—Western portion. 2892. North America, east coast :—Narragansett bay. 2563. North America, east coast :—Delaware river (sheet 1). 2885. North America, west coast :—San Diego bay, Ensenada anchorage &c. 2812. Africa, west coast :—Lagos river. 386. Africa, west coast :—Princes island, &c. 2865. Africa, east coast :—Mouths of the Zambesi river. 1811. Africa, east coast :—Chala point to Kwyhu bay. 40. India, west coast :—Karachi harbour. 833. Bay of Bengal :—Rangoon river and approaches. 941b. Eastern Archipelago :—Western portion. 942a. Eastern Archipelago :—Eastern portion. 2575. Eastern Archipelago :—Celebes sea, eastern part. 2618. Formosa island :—Ke-lung harbour. 1186. Manchuria :—Goskevitch bay, &c. 1068. Australia, east coast :—Moreton bay to Sandy cape.

J. D. Potter, Agent.

ATLASES.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von —, 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Elfte (11) Lieferung. Inhalt: Nr. 35, Spanischen Halbinsel in 4 Blättern, Blatt 3 in 1:1,500,000 von C. Vogel. Nr. 66, Afrika in 6 Blättern, Blatt 1 in 1:10,000,000 von R. Lüddecke. Nr. 86, Vereinigten Staaten von Amerika in 6 Blättern, Blatt 4, in 1:3,700,000, von A. Petermann. (Neu bearbeitet v. H. Habenicht, 1888.) Gotha, Justus Perthes, 1889. Price 1s. 6d. each part. (*Dulau.*)

Sheet 35 contains the southern portion of Portugal, and the south-western provinces of Spain. The heights are given in metres, and lines of soundings from twenty metres to one thousand are laid down. This sheet also contains some notes on the political divisions of Spain and Portugal, and an explanation of the signs and abbreviations used in the construction of the map. Sheet 66 is the first issue of an entirely new six sheet map of Africa; it contains a portion of Southern Europe, Morocco, Algiers, Tripoli, and the Sahara. The relative importance of places is expressed by the size of the characters in the writing, and the system of orthography officially adopted by all the European States has been retained so far as their possessions are concerned; for the rest, the names of places are spelt as they are pronounced in German. With each issue of this map a list of the authorities used in its compilation is given, and the coast-line has been taken from the charts of the British Admiralty. The heights and depths are given in metres. Judging from the present sheet, this map promises to be the most perfect map of Africa, of its scale, yet published. Sheet 86 contains all that part of the United States which lies west of the 106th meridian, and south of the 39° of north latitude, on its eastern boundary, and the 37° on its western; it also includes Lower California, and other parts of the Republic of Mexico.

PHOTOGRAPHS.

Afghanistan.—Thirty Views of Kabul and its Environs, from photographs taken in Afghanistan in 1879. [Presented by Colonel E. T. Thackery, c.m., v.o.]

This album contains a series of thirty fine views of Kabul and its environs; reproductions by the autotype process from photographs taken in 1879.

Central Asia.—Photographs taken by Professor Mushketoff to illustrate the Seismographic Phenomena in the Issik-Kul district. [Presented by Professor Mushketoff through Miss M. B. Hay.]

This donation consists of eighteen photographs selected from a number taken to illustrate the account of Professor Mushketoff's expedition to investigate the seismographic phenomena in the neighbourhood of Issik-Kul.

Himalaya Mountains.—Six Photographs of —, as seen from Darjiling, taken by Messrs. Johnston and Hoffmann, Calcutta, and presented by them through Chas. E. Pitman, Esq.

These are six fine specimens of photography, consisting of views taken in the neighbourhood of Darjiling. They include views of Kanchinjanga and Everest from Sanchal, admirable views of Kanchinjanga at sunrise and sunset, the snows from Woodlands, Darjiling, and the Snowy Range, Sikkim.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

The Annual Address on the Progress of Geography: 1888-9.

By General R. STRACHEY, R.E., F.R.S., President.

(Delivered at the Anniversary Meeting, May 27th, 1889.)

It will be satisfactory to you to learn from the Report of the Council that the condition of the Society both as regards its numbers and financial position is all that could be desired. The number of Fellows has fluctuated during the last five years between 3350 and 3400, the present year showing the lowest amount, which may be partly accounted for by an unusually large number of losses by death. Considering the very large total number, however, the variations are really immaterial. Similar observations will apply to the income of the Society, which may be looked upon as amounting to 8000*l.* yearly.

Among the names of those rendered illustrious in the annals of geographical discovery who have passed away during the last year, I desire specially to recall that of Prjevalski, who for the last twenty years of his life was devoted to the exploration of Central Asia, the map of which he may be said to have created. This Society is honoured by having his name among its Gold Medallists. He died as he was about to start on a fresh expedition, animated to the last by his never-failing zeal in the cause of geographical knowledge.

The arrangements to which the Council has given effect during the last two or three years with a view to the improvement and extension of geographical education in our own country, have continued in successful operation. Some delay has unfortunately arisen in connection with the appointment of the Lecturer on Geography at the University of Cambridge, from the failure of the health of the gentleman first selected, but a fresh nomination has now been made, and I have no doubt that a satisfactory commencement of the lecturer's work will now be carried out.

Proceeding now to review, according to custom, the progress of exploration and the chief geographical events of the year, the first subject which presents itself is the remarkable journey of Mr. Stanley

through the hitherto unknown country lying between the great bend of the Congo and the Albert Nyanza. The reading of Mr. Stanley's letter to the Society and the discussion on it are, however, of so recent occurrence that it is unnecessary for me here to repeat any part of his narrative, the chief facts of which must by this time be familiar to you. You must all have appreciated that the difficulties and dangers of the region he had to traverse had been by no means over-coloured in the great traveller's letter, and have felt increased admiration for the indomitable resolution, the courage, resource, and endurance which he has displayed in this latest of his numerous achievements. I will only remind you of the novelty and interest in a geographical point of view of the newly discovered region, and the important physical and climatal problems suggested by the remarks of Sir Samuel Baker on the possible persistent desiccation of Albert Nyanza, in which he seems to be supported by the observations of Emin Pasha, and by the existence of a wide tract of continuous tropical forest spreading into the heart of the continent. To throw full light on these, on the true character and extent of the lofty mountain range seen by Stanley, and on such matters as the distribution of the dwarf race in the interior of the continent, another topic of singular interest, further and more systematic observations are necessary, and the subjects for enquiry are of so much intrinsic scientific importance that there will probably be no lack of workers in so attractive a field in the near future.

In other parts of the Congo basin further progress has been made in filling up the blank spaces on our maps. The Ngala, a tributary of the right bank, has been for the first time ascended by Lieutenant Baert and Mr. Werner. One of the great southern tributaries, the Lomami, has been again ascended by a Belgian officer, M. Delcommune, who appears to have reached a higher point than that attained by the Rev. G. Grenfell in 1885; the chief interest of this stream is that, being navigable nearly to the latitude of Nyangwé, it is considered likely to prove the best route to that important station, as being much more direct and avoiding the obstruction of the Stanley Falls.

Next in novelty and general interest to Mr. Stanley's great achievement is Mr. F. S. Arnot's journey across that part of the central plateau of Africa which lies between Benguella on the west coast and the sources of the Congo. As he told us in the account of his explorations he gave to the Society, Mr. Arnot first entered Africa at Natal, and had spent seven years travelling in the interior, carrying out with slender resources his self-imposed mission of discovering tracts of healthy country for the establishment of missionary and philanthropic stations. He crossed the continent from Natal north-westward to Bihé and Benguella, a distance of 2000 miles, and thence, supplied with ampler means, he equipped a caravan and started afresh eastward, and after another journey of about 1000 miles reached the remote and little

known Garenganze country, the country of the famed Katanga copper mines and cave-men, spoken of by Livingstone. The country had been visited not long previously by Dr. Böhm and Herr Reichard coming from Lake Tanganyika, and also by MM. Capello and Ivens, arriving by a different route from the south-west, but Mr. Arnot adds much to the information supplied by those travellers regarding the country and its people. The route followed by him from Bihé eastward was entirely new, and took him across the numerous streams which form the head-waters of the Zambesi, his observations on which have enabled us to lay down for the first time an approximately accurate delineation of the sources of that great river, and have further contributed to our knowledge of the heads of the south-eastern affluent of the Congo.

Mr. Arnot left England two months ago well equipped for a further exploration of the same part of the African interior; and the Society took advantage of the occasion by placing in his hands the proceeds of the Murchison Grant of the year, for the purpose of selecting and conveying a suitable present to Chitambo, the chief of the Ilala country, where Livingstone died, as a reward for the assistance given to our great traveller's followers in conveying his body and personal effects to the coast.

Considerable additions have been made during the year to our geographical knowledge of West Africa north of the Equator. Of especial value is the new map of the Niger delta published in our 'Proceedings' for December, in illustration of Mr. H. H. Johnston's excellent descriptive paper on the region. The map was compiled by Mr. Johnston from the results of his own surveys during the numerous journeys undertaken in the discharge of his Consular duties, combined with much previously unpublished material supplied by the Royal Niger and the Liverpool African Companies and other authorities. In the Cameroons region also much has been done, especially by Dr. Zintgraff, who has filled up by his surveys wide gaps in the topography of the country north and west of the chief mountain mass. The results of an adventurous journey into the interior by Lieutenants Kund and Tappenbeck prove that the basins of the rivers of the Cameroons region are sharply separated from that of the Congo, and that there is no likelihood of a waterway being found, as some speculative geographers had supposed, between the two river-systems. Mr. H. H. Johnston has further contributed to the Society's 'Proceedings' the fruits of his researches into the singularly mixed distribution of the native races in this part of Africa.

In East Africa the most striking achievement has been the discovery of a great lake some 300 miles to the north-east of Victoria Nyanza, by the adventurous Hungarian traveller Count Teleki. The lake is doubtless that known from native report as Lake Samburu, the situation of which had been approximately given by Mr. Joseph Thomson and

Mr. Ravenstein. The new lake, which has been re-named by its discoverer Lake Rudolf, was found to lie between $2^{\circ} 18'$ and $4^{\circ} 42'$ N. lat., in a nearly north and south direction. It is about 162 miles long, but not more than about 20 miles wide; whether salt or fresh-water the brief preliminary account published does not enable us to decide; a second smaller lake to the north-east, which was also visited, was salt. The country around is described as bare and arid, and the banks of the lakes and rivers to be scantily peopled by Gallas, who live by fishing. Count Teleki left Zanzibar on his expedition in February 1887. On his way north he diverged from his route to visit Mount Kenia, and ascended this rival of Kilimanjaro to a height of 15,000 feet, or nearly to the snow-line. He returned to Mombasa in October last, and on his arrival in Europe we shall no doubt receive fuller details of his important discoveries.

Kilimanjaro has been again ascended this year nearly to the summit; this time by Herr Otto Ehlers from the north side, in November last. He describes the ice-wall, the foot of which Dr. Meyer reached the previous year, as being the edge of a cap of névé, which covers the summit, and which, by the action of the wind and radiation, has been partly cleared on the north side, but appears to form on the south side a true glacier issuing from the crater-trough of the summit. Dr. Meyer has attempted a second time to reach the mountain, but met with insurmountable obstacles on the way due to the disturbed state of the country. Before his enforced return to the coast, however, he travelled over a new route through part of Usambara, and has published an admirable description of that mountainous and wooded region.

In Central South Africa that indefatigable traveller, Mr. F. C. Selous, has added to his former achievements an adventurous journey across the Zambezi and along the Kafukwe river, of which he has contributed a valuable map to the 'Proceedings' of our Society.

Our knowledge of Morocco, and especially of the Atlas Mountains, has been substantially increased during the year, first by the publication of M. de Foucauld's admirable work, '*Reconnaissance au Maroc*,' with its accompanying maps in 25 sheets, which gives the results of four years' travel and exploration in the country; and secondly by Mr. Joseph Thomson, who during his exploratory journey last spring and summer, succeeded in reaching great elevations in the Atlas, and afterwards crossed the range into the Sus valley and reached Mogador by the coast road. The map of Southern Morocco, drawn up from Mr. Thomson's route-surveys and observations, and published in our 'Proceedings,' gives a new delineation of the mountain range with its valleys and passes between Demnat and Gindafy. Another traveller in Morocco, Mr. Walter B. Harris, has given us an account of his adventurous excursion to the inhospitable city of Sheshouan.

In Madagascar, some progress has been made in the work of explora-

tion and survey by French residents and travellers, principally by Père Roblet, who, following the example of Dr. Mullens and many of the missionaries of the London Missionary Society, has, in his intervals of leisure, accurately surveyed an extent of country in the provinces of Imerina and Betsileo, measuring 310 miles in length by from 90 to 125 miles in breadth. The French Ministry of Marine has issued a new map of the southern part of the island in which the river systems, partly due to the surveys of M. Grandidier, the active explorer and munificent promoter of all scientific work relating to Madagascar, are laid down accurately for the first time. Valuable additions to our knowledge have also been made by the Rev. B. Baron, a missionary who has given much attention to science during his long residence in Madagascar, and has recently communicated to the Geological and Linnean Societies his observations on the geology, physical geography, and botany of the island.

The almost inaccessible Christmas Island, a solitary fragment of land in the Indian Ocean, has been the subject of a most interesting paper by the hydrographer, Captain Wharton, read at one of our meetings last session, in which he gave a summary of the recent observations of naval surveyors on the curious geological structure and topography of the island.

In the work of filling in the details of Central Asian geography, Russian travellers have recently shown increased activity, not only in geographical exploration and survey, but in the systematic investigation of the physical geography, geology, zoology, botany, and ethnology of the less known regions. During the year our 'Proceedings' have from time to time given brief notices of the work accomplished by many of these zealous explorers; among them M. Grombchevski, who traversed the Pamir from north to south, and adventurously crossed the Hindu Kush into Hunza; M. Lidsky, member of the Society of Naturalists of St. Petersburg, who explored Karategin and the eastern part of Bokhara, and M. Grum-Grijmailo, who travelled over the eastern part of the Pamir, and by the upper course of the Yarkand river, and over the Kalik Pass into Kanjut, returning to Russian territory via the Tashkurgan river and Little Kara-kul to Kashgar; for which achievement he was awarded a gold medal by the Russian Geographical Society. Special studies have been made of limited areas by other Russian savants. Thus M. Nikolsky, who has explored Lake Balkash and adopted the conclusion, on the ground of differences in the fish-fauna of the lakes, that the Balkash basin has been separated for ages from the valley of the Chui, communicating with the barrier of the Aral-Sea, but that it was joined, at a comparatively modern date, to the Sassyk-kul and Ala-kul basins to the eastward. M. Kuznetzof, another naturalist, has in a similar way investigated the Sea of Azov, and M. von Krasnof has published during the year the result of his botanical and geological explorations of t'

Thian Shan. The new expedition, that started under General Przevalsky, but was arrested on its march by the death of this great traveller, is announced as having been resumed under the leadership of M. Pievtzov, whilst the varied scientific results of Przevalsky's former expedition are being published in a series of memoirs by the respective specialists engaged upon them.

The exploration of the higher elevations of the Caucasus by experienced Alpino travellers, which was resumed by our Secretary, Mr. Freshfield, in 1887, was continued by three parties of Englishmen with Swiss guides in the summer of 1888. The result gained has been the ascent of several of the chief summits of the chain, thereby throwing further light on its structure and the relative heights of its loftiest peaks. The successes of the year were, however, sadly clouded by the loss of the valuable lives of Messrs. Donkin and Fox and their two Meyringen guides, it is supposed by an avalanche; the exact nature of the misfortune is not yet known, but may possibly be ascertained during the present season. During the year the pages of our 'Proceedings' have contained two important contributions to Caucasian geography from the pen of Mr. Freshfield, and some fresh light has been thrown on the details of the orography of the chain by the publication of a map by M. Golovievsky, of the Russian Survey, of the sources of the Baksan and the fixed points of the new physical survey of the central portion of the range lately undertaken by the Russian Staff.

I may here also notice Mr. Curzon's lucid and interesting description, recently read before the Society, of the country through which the Transcaspiian Railway passes, from the shores of the Caspian to Samarkhand.

In all parts of our Indian Empire, and beyond its limits east and west, extensive operations both by actual surveys and explorations and reconnaissances have been carried on, and the results are recorded in the last Annual Report of Colonel H. R. Thwaites, R.E., Surveyor-General of India, just received. The newly acquired territory on the east in Burma, as well as Baluchistan on the west, have been vigorously dealt with, affording the indefatigable Survey officers employed full scope for their ingenuity and talent. The recent great additions to the area of the British possessions, and of the unmapped regions on the frontier, have necessarily much enlarged the scope of the operations of the Indian Survey, and will call for an extension of the triangulation, which previously, for India proper, may be said to have been completed; and the filling-up of so much ground of a new and almost untrodden character will for some time to come give full employment to a considerable portion of the Survey staff.

While ordinary extensions of surveys in many parts of British India have been carried on as usual, it has been possible to provide maps of countries beyond the frontiers, where no European has or could set foot,

by the employment of properly trained and educated natives. In all, maps of 27,223 square miles of country have during the year been added to our previous geographical knowledge. In addition to this, 20,082 square miles have been traversed and connected with the main triangulation, for the purpose of aiding the revenue officers in various districts in completing cadastral detailed surveys for settlement purposes.

Major Hobday has carried on surveys in Upper Burma in connection with the various military expeditions employed in the pacification of the country, and Captain Jackson, R.E., has been equally active in the Southern Shan States, with a native assistant in the Northern Shan States, and materials have been obtained for a valuable map of the Assamese Shan States. The military expedition into the Yaw country and Mogoung has likewise secured a considerable area of topography, and the Ruby Mines district has been laid down on a large scale. As the result of the season's operations in Upper Burma, triangulation of a secondary class has extended over 23,000 square miles, and nearly 21,000 square miles have been surveyed for the preparation of a new general map of the recently annexed territory.

An important expedition to explore the routes leading from Upper Assam to the Hukong Valley in Upper Burma was accompanied by Mr. M. J. Ogle, a valued member of the Survey Department, to whom the Gill Award has been made this year, and whose name has been connected with interesting and enterprising explorations on the north-eastern frontier of late years; he managed to survey about 1500 square miles of totally unknown country lying to the south of the Palka range, connecting it with work previously performed by that excellent officer, Colonel Woodthorpe, C.B., R.E. This information establishes the practicability of direct communication from Assam to Burma over the Palka Pass by either of two routes explored.

An interesting account of an expedition from Eastern Bengal through Manipur to the Chindwin river in Western Burma, was also communicated to the Society by Colonel Woodthorpe.

The military expedition on the North-west Frontier, to the Black Mountains, gave an opportunity for the prosecution of surveys of a region hitherto almost inaccessible, on which it was most desirable to throw further light. Captain Wahab, R.E., was consequently deputed with a suitable staff, and he mapped an area of 423 square miles, including a considerable tract across the Indus adjoining Buner, and of the Indus valley above Thakot. Our knowledge of the Hazara border, especially along the Indus, has thus been materially improved.

The Afghan Rectification boundary survey has likewise been completed by a native assistant who on his return journey to India managed very adroitly to pick up about 4600 square miles of entirely new country—a most valuable addition to our knowledge of Afghanistan, a general

map of which country, embodying all recent surveys, has been compiled and printed on the scale of twenty-four miles to the inch, though its publication will probably not be authorised by the Government.

In New Guinea, some progress has been made in unveiling the mysteries of the still unknown interior by German explorers in their territory on the northern coast. Count Pfeil, the new Administrator, made, soon after his arrival last year, a short journey inland from Finsch Haven, with results as regards the practicability of the country that thoroughly disappointed him. No tableland was seen, nothing but a mass of rugged mountains, a hopeless region for European or any other settlements. Dr. Hollrung, a botanical traveller, after a longer experience, confirms this description, as far as the southern part of the territory is concerned; but he states that the northern part, from about 4° N. lat. to the Dutch boundary, is flat, and the number of its rivers surprisingly great, the chief of them being the Empress Augusta river, which is navigable for large ocean-going steamers for a distance of about 100 miles from its mouth. Another traveller, Dr. H. Zöller, in November last, ascended the Finisterre Mountains to a height of 9000 feet, and discovered another range further inland rising to a height of about 10,000 feet. In the New Guinea seas a useful addition to our geographical knowledge has been made in a chart with descriptive paper communicated to our Society, of the Ké Islands, appertaining to the Dutch settlements in the Eastern Archipelago.

With regard to other parts of the world, the most conspicuous achievement of the year is undoubtedly the crossing of the icy plateau of Greenland from east to west by the adventurous young Norwegian Dr. Nansen. The difficulties of Dr. Nansen and his heroic little party commenced even before they landed, for being launched in their boat from the sealing vessel which took them to the edge of the ice in lat. $65^{\circ} 2'$, they were caught in the drift and swept southwards for 200 miles, thus spending a whole month before they effected a landing and began to climb the steep escarpment of the inland plateau. The difficulties of the journey, aggravated by the violence of the snowstorms, prevented them from carrying out their original programme of crossing to Disco Bay, and they were forced to take a south-westerly course, and after forty-six days' travelling, passing two weeks together at an altitude of more than 8000 feet, and enduring the most intense cold, the temperature being reckoned by Dr. Nansen to have fallen below -50° F., or 80° below the freezing-point of water, they reached the hospitable port of Godthaab, on the western coast, unfortunately just too late to catch the last vessel of the season sailing for Denmark. The return of Dr. Nansen to Copenhagen from his enforced Arctic winter quarters has just been announced, and we entertain a hope that we may hear from his lips an account of his remarkable journey, at the meeting of the Society on the 24th June.

It remains for me to notice, briefly, the interesting account given us by the Rev. W. Spotswood Green of his exploration of the Selkirk Range in British Columbia last summer, the higher portions of which he surveyed and mapped; the description of Hudson's Bay, and discussion of its practicability as a sea-route to the North-western Territory of Canada; some fresh information relating to Yucatan, in Central America; and the paper by Captain Page on the great plain in the Argentine Republic known as the Gran Chaco and its great rivers the Pilcomayo and Vermejo, affluents of the Parana or Paraguay, in which the inundations and changes of channel of these capricious streams were well described, chiefly from the personal observations of the author.

Admiralty Surveys.—I am indebted to the Hydrographer, Captain W. J. L. Wharton, R.N., F.R.S., for the following summary of the Admiralty surveys of the year:—

Under the orders of the Lords Commissioners of the Admiralty, hydrographical surveys have been in progress on the shores of the United Kingdom; in the river St. Lawrence; St. Lucia island, West Indies; Red Sea; the Grecian shores; Africa, east coast; Borneo; China; Tasmania; North-west coast of Australia; Queensland; Louisiade Archipelago; and Pacific Ocean. These surveys were carried on by eight steamships of war, one sailing schooner of H.M. Navy, and two hired small steamships, manned by 72 officers and 703 men. Naval surveying officers are also employed with the sanction of the Admiralty under the Indian Government and Dominion Government of Canada; the results of their labours are also herein mentioned.

A detailed report of the labours performed by the surveying officers serving in each surveying vessel during 1888 has been prepared, and will, in accordance with custom, shortly be presented to Parliament. The following is a précis.

On the shores of Great Britain, the re-survey of the Duke of Edinburgh, Alexandra, Princes, and Knob channels in the Thames estuary showed that considerable alteration in the depths and widths of those channels had taken place since their previous examinations. The ship channel at the entrance to the Medway river was re-sounded.

In the North Sea, immediately outside the river Humber, an area of 250 square miles has for the first time been sounded over. That portion of the north coast of Wales from Great Orme Head eastward to the river Dee was re-surveyed; this survey embraced several shallow sand-banks fronting that coast, together with the approaches to the river Dee.

In Ireland, Queenstown harbour and the Port of Cork were re-sounded, and since the last survey of this capacious harbour in 1843 many important changes had taken place. At Waterford, parts of the river inside Passage were re-examined. The South Shear channel leading into Wexford South bay was also re-surveyed.

On foreign and colonial shores—In the river St. Lawrence, that part of the river above Berthiet and Seminaire to Quebec, embracing the Isle of Orleans with the channels on either side of the same, was surveyed, thus completing, with the work executed in 1886 and 1887, the portion from Quebec eastward to Goose Cape. A new plan of the channel between Hare island and the south shore of the river was also executed.

The survey of St. Lucia Island, West Indies, was completed.

In the southern part of the Red Sea northward of Jebel Zukur Island a fresh search (the fourth) was made for the sunken danger on which it was reported that two British steam vessels had struck. This search was crowned with success by the discovery of a small isolated coral patch, with as little as 15 feet of water over it, in $14^{\circ} 22' 08''$ N. lat., $42^{\circ} 41' 32''$ E. long., which has been called the Avocet Rock. In consequence of the discovery of such a formidable danger so far from land, and near the line of the heavy traffic in the Red Sea, an examination of other suspicious spots in the area between Jebel Teir, Zebayir, and Jebel Zukur Islands was undertaken in the interests of British shipping, but no other dangers to navigation were found. The unsuspected existence of this rock, with such an enormous number of vessels continually passing near it, is one of the most remarkable instances of the kind on record.

Port Said, at the Mediterranean entrance of the Suez Canal, was re-examined. It is remarkable that the rapid silting, which for many years after the construction of the Port Said breakwater was taking place at the entrance of the Suez Canal, has now diminished to a very small proportion of its former rate.

On the Grecian shores, the Gulf of Volo was re-surveyed. A new plan was made of Corinth bay and isthmus, embracing the canal now in course of construction. The roadstead of Vostitza, on the south shore of the Gulf of Corinth, was also re-sounded.

On the east coast of Africa, in the neighbourhood of Wasin Island, the coast from Gonani bay northward to Chale Point was surveyed; this survey embraced the entrance to the river Umba, forming the boundary between the English and German spheres of influence. Plans of Kilifi river, with Takaungu, were executed; and also of the approaches to Port Mombaza with Ports Reitz and Tudor.

In Borneo the approaches to Bruni river with the coaling harbour of Muara were minutely surveyed.

In the China Sea the Tizard and Macclesfield banks were visited to ascertain their slopes and zoological condition. On the seaboard of China a detailed survey was executed of that portion of the Chusan Archipelago which lies between Video island on the east and West Volcano island on the west, embracing the northern half of the Chusan as well as the Fisherman, Chang-tan, Tae-shan, and Volcano groups of

islands, representing 340 miles of coast, and 850 miles of soundings. A special report of interest was made respecting the Eagre or Bore of the Tsien-kang-kiang, concerning which there has been hitherto no reliable information, but which is stated to be one of the grandest instances of this phenomenon.

In Tasmania that part of the north coast from Waterhouse island westward to Five Mile Bluff near Port Dalrymple was surveyed, and on the south coast the approaches to Hobart were completed by the survey of the south and east coasts of Bruni island.

On the north-west coast of Australia, the most intricate portion of Cambridge Gulf, viz. that of the west arm from Islet Point southward to The Gut was charted.

In Queensland the part surveyed extended northward from Rockingham Channel to Dunk island. Additional soundings were also obtained in various localities near the inner edge of the Great Barrier reef.

The survey of the Louisiade archipelago commenced in 1887 was completed, and it is satisfactory to state that most friendly relations were established with the natives of those islands, who have always borne an evil reputation. Some of them served as supernumeraries on board the surveying vessel.

In the Pacific Ocean a systematic examination of the bed of that ocean between New Zealand and the Sandwich islands was begun in the general interest of navigation. The soundings obtained in the course of this will be of service in giving preliminary data for the choice of a route for a telegraph cable between the British possessions of Canada and Australia, when the time arrives to carry out that project. Deep-sea soundings were obtained in the direct line between New Zealand and Tonga, Tonga and Fiji, thence to New Zealand; also between Kermadec islands and New Zealand.

It is worthy of mention that in S. lat. $24^{\circ} 37'$, W. long. $175^{\circ} 08'$, a depth of 4428 fathoms red clay, by far the deepest yet found south of the Equator, was successfully obtained.

During these sounding cruises the localities assigned to several vigias and reported reefs were examined; the Wolverine bank, Pelorus shoal, and La Rance bank being well sounded over and defined. A survey of Tongatábu was commenced and carried on in the brief intervals of the sounding cruises.

Under the orders of the Indian Government the survey of Duncan passage and Manners strait, Andaman islands, executed late in 1887, was extended northward to Port Mouat and Port Blair. This survey embraced North Sentinel Island. Port Blair was surveyed on a large scale. The Western Coral banks, Andamans, and the bank south-west of Little Andaman, were examined in detail. On the coast of Malabar a survey was made from Cannanore to Mahé, with separate large scale plans of the anchorages at Cannanore and Tellicherry.

Under the Dominion Government of Canada, the survey of the northern shores of Lake Huron was continued. That portion of the south-west part of Georgian Bay from Cabot head to Point Rich, with special plans of Owen Sound, McGregor harbour, and Lion's head, was completed; and a separate plan of Collingwood, with its approaches, in the south part of Georgian Bay, executed.

The Hydrographic Department during the year has published 65 new charts and plans, improved 15 charts by the addition of 25 new plans, and made 4134 corrections to the chart plates.

On a review of the recent progress of geographical knowledge, a record of which it has been the custom to supply year by year in the Addresses from this chair, the reflection can hardly be avoided that great as has been the advance of exploration in Africa during the last twenty or thirty years, the interest of geographers will in the immediate future be more and more centred in that continent. Excluding the Polar Regions, there is no considerable portion of the earth's surface, unless in Africa, which has not become fairly accessible, and the essential geographical features of which have not been delineated. And as the unknown becomes more closely circumscribed, the contrast between our relations with it and the known becomes more striking. I know few things more fitted to affect the imagination vividly than a comparison of the almost instantaneous communications now constantly going on between places as far asunder as the dimensions of the globe admit and the absolute silence that closed over Stanley when he started on his latest plunge into the darkness of Central Africa; a silence which, having lasted nearly two years, has only once been broken, though the distance to which his journey extended beyond the outposts of civilisation has hardly exceeded what, had it been from our own doors, might have been traversed in eight or ten hours.

That the time is almost come when the last of the barriers that have excluded us from these hitherto unknown regions will be broken through is no longer doubtful, and we are being brought more and more closely in presence of what will be the great practical geographical problem of the coming generation, the establishment of the supremacy of modern progress and civilisation over the African continent. Such a subject affords a very wide field for speculation, and I have thought that its interest will justify me, with a view to supplying some indications of the probabilities of the future, in attempting to place before you in a succinct form the main features of the changes that have followed the more important movements of a corresponding nature in other parts of the globe.

There is no room to doubt that the occupation of the earth by man in the many various modes presented to us has been determined mainly by the physical conditions of the surface, the distribution of land and sea, and the nature of the climate, operating in conjunction with the

particular inherited capacities of the several branches of the human race, which have themselves been largely determined by these same physical conditions.

The diffusion of races, and their more or less permanent occupation of various parts of the earth, have necessarily been regulated by their relative powers of adapting themselves to, and taking advantage of, the facilities for existence offered by the regions they occupied, and of resisting adverse pressure of all sorts brought to bear upon them from without.

Among the best safeguards against that form of pressure which consists of the intrusion of other races, have ever been isolation by the ocean, or by high mountains, great land distances, forests and deserts; and hence the interiors of the great continents have for the most part been last explored, and their inhabitants least disturbed. As the first of these defences was weakened by the development of the arts of navigation the progressive races of Europe began to seek for fresh scope for their activities in many distant regions, thus for the first time rendered accessible to them. From very small beginnings within the Mediterranean, which for several centuries gained strength only by slow degrees, at length burst forth some 400 years ago the stream of conquest and commercial adventure which has in our time been carried across every part of the ocean; and has beaten on all its shores, throwing open an infinitude of lines of attack for the inroads of European progress upon regions previously resting in various conditions of primitive stagnation.

For my present purpose it is not necessary to refer to the unquestionable differences of capacity for successful emigration possessed by different races, or to enter on the motives that led to these migrations, or to follow the steps by which certain regions fell to the lot of particular nations. I shall only briefly say that it appears to me that the varying extent and character of the consequences attending, what I have termed the attacks of European progress on the less advanced races, have been mainly determined rather by the relative strength of the resistance to be overcome in each case, than by any important differences of aggressive energy or skill among the various intruders. In almost every case the resulting changes have been brought about subject to the more or less favourable physical conditions of the new country, by a very gradual process of growth and development, primarily dependent on the success of individual action on the part of the superior race, in overcoming the resistance to disturbance offered by the numbers or qualities of the original population, and subsequently in controlling or directing it.

The most remarkable of the changes thus produced is unquestionably to be found in North America, where a continent almost double the area of Europe has been virtually re-peopled by immigrants from without, and is already in a condition that places it on an equality with the most

advanced countries of the old world, to which its existence was unknown 400 years ago. This result is no doubt due to the inherited incapacities of the earlier population, which delivered them, a race of mere hunters with no hold on the soil, and without organisation or intellectual or other resources beyond their savage craft and courage, to an utterly ineffectual conflict with settlers from the most energetic and advanced nations of Europe, who on their part found in the new country a climate perfectly suitable to them, and great natural advantages of every description freely open to their industry and ingenuity.

The history of Australia is analogous to that of North America. Here was a vast territory, in area but little less than Europe, sparsely occupied by a feeble race, probably the lowest in respect of its social state of any known, which, previous to its discovery by the early navigators, had made no sensible advance towards a condition deserving the name of civilisation. Though the first settlement of our countrymen took place nearly a century ago, they made little progress till within the last fifty years, since which time the increase of the immigrant population and the development of wealth has, as I need hardly say, been exceedingly great. The native races do not now supply two per cent. of the population, and the present condition of the Australian colonies affords complete evidence that the former wholly undeveloped state of a large part of this great continent was essentially due to the deficiencies of the isolated race that occupied it, and not to physical difficulties inherent in the country itself, the great capabilities of which in the hands of a population possessed of suitable aptitudes have been fully established.

Very different have been the results of the contact of European civilisation with the productive and populous countries forming the south-east portion of Asia, namely India and China. Here, races endowed with those qualities which are requisite for the formation of settled communities devoted to agriculture and commerce, had long been established, maintaining such intercourse with neighbouring countries as the conditions of the time admitted. The land was occupied by a large population under primitive but regularly constituted governments, so that little opening was offered for such immigrations as have taken place in North America or Australia; while further protection was given by the semi-tropical climate which offered an insuperable obstacle to the success of a colonisation recruited from Northern Europe. Both in India and China then, we find that the earlier European adventurers were unable to carry their occupation beyond the formation of settlements on the coasts. These, which were for the most part originally commercial in their character, were in India by degrees transformed into political centres from which a European administration has been extended over the whole country, to a great extent superseding the former governments, but

without interfering with the continued occupation of the land by its original population, now numbering some 250 millions, still living with little social change under their ancient customs, and virtually with no admixture of foreign blood.

In China, under conditions which at first might appear not greatly dissimilar from those of India, the results have been altogether different, for the relations of foreigners with China have undergone comparatively little change since it was first visited from Europe, and their earlier complete exclusion has even now been but partially relaxed. No more remarkable illustration of the force of passive resistance can be found than that supplied by China in its long successful opposition to the introduction of Western methods of thought and action, the acceptance of which has been almost completely prevented by a singular instinct of self-preservation.

Turning next to Central America, where the tropical conditions of climate are unsuited to the domestication of the northern races for purposes of labour, the early Spanish and Portuguese conquests have been succeeded by the formation of communities in various stages of political and material progress, in which a dominant class of European extraction is united to a population composed of descendants of the original inhabitants, in almost every case largely supplemented by a mixed race, and in some places entirely modified or superseded by the introduction of slaves from West Africa. The greater facility for amalgamating with the foreign populations with which they are brought in contact, which appears to characterise the Latin as compared with the Teutonic races, seems to have had an important effect on the manner in which the immigration into these countries has operated.

Passing to the more temperate portions of South America, there is reason to think that the flow of immigration which has set in strongly within the last few years may not improbably bring about an occupation by settlers from Europe of that part of this continent where the climate and capacities of the soil appear to be very favourable to such a result, and the character of the remaining tribes of the original population is not such as to offer any serious obstacle to it; and the eventual creation there of a nationality analogous to that already fully developed in North America, but mainly recruited from the Latin races of Europe.

It remains for me to speak of Africa. The temperate region lying along the Mediterranean is for the most part occupied by a race apparently not distinct from that which has spread over Europe. This region still remains under the impress it received from the Arab invasion which extended over it into Spain in the 8th century, but it has in a great measure now come within the field of European politics, and thus has virtually passed out of the range of such influences as those to which I am referring.

The temperate portion of South Africa has shared the general fate of

countries accessible by sea, suited for northern immigration, and formerly occupied by a semi-barbarous people. Here, however, the native population has displayed far greater powers of resistance to the intrusion of immigrants, and the physical conditions of the country itself have probably been less conducive to successful colonisation. A relatively very large and powerful native population still stands in the way of any such complete appropriation of the country by the foreigners as has taken place in North America or Australia; the history of the South African colonies gives often repeated evidence of the strength of the opposition to it; and it may well be doubted whether it can ever be effected.

It is to the remaining parts of the continent lying within the tropics that I have finally to refer, in connection with whose probable future these remarks have been submitted to you.

The vast area of tropical Africa, its climate, often so hostile to Europeans, and the numbers and character of the population, combined with the peculiar difficulties attending all transport in the interior, have retarded the progress of geographical discovery, and obstructed that intercommunication between neighbouring districts which supplies the natural machinery by which the progress of the less advanced races is carried forward. It is impossible to suppose that the impression to be made on these countries by the mere handful of men of northern race who are now scattered along its coasts or at a few points in its interior, can be anything but extremely slow, and it is hardly less certain that under the wholly different conditions that Central Africa presents from those of any other country hitherto brought within the operation of the process of civilisation, the form which that process will take, and its results, will be very different from anything that past experience can suggest. The possibility of any colonisation by direct immigration on such a scale as to produce effects in any way analogous to those obtained in North America or Australia is obviously excluded; the condition of the people over the greater part of the continent renders it equally impossible to look forward to a time when systems of administration at all approaching that of India could be established; and amalgamation between European settlers and the indigenous races appears no less out of the question.

The operation of bringing a population such as that of Central Africa under the restraints of civilisation will necessarily be a long and no doubt in some respects a painful one, for assuredly the conflict with slavery, cannibalism, and massacre cannot be carried to a successful issue by gentle means alone. The dangers that attend precipitation, with consequent reaction, have been already exemplified too plainly, and by the sacrifice of too many noble lives; and in circumstances such as those that here have to be dealt with, toleration of unavoidable evil at the outset may well afford the best and most certain means of introducing

permanent improvement. Nor can I see any reason to question the conclusion that the best method of entering on this gigantic task is that which the general sense of Europe has practically resolved to adopt, namely, to form commercial associations entrusted with the exercise of reasonable administrative authority within the several areas assigned to them, hoping that thus the African population may by degrees be taught that the path to social and material comfort and well-being lies through well-ordered industry and peaceful occupations; in imparting which lessons the earnest co-operation of the many purely philanthropic missions already established among these people may be most confidently counted on and will doubtless have a very important effect.

This being the last occasion on which I shall occupy this chair as your President, it is incumbent on me to express to the Society at large, and to my colleagues in the Council in particular, my grateful sense of the support I have received from them during my tenure of office. To the permanent officers of the Society my sincere thanks are also due, and especially to our assistant secretary, Mr. Bates, whose indefatigable industry is one of the most important factors in the successful management of the Society's business. To him I feel myself personally indebted for the aid given to me in the discharge of my duties, to an extent that if would be impossible to exaggerate; and I only abstain from saying more as to his scientific attainments, ability, and value, because I am confident that they are so well known and appreciated by all of you.

OBITUARY FOR 1888.

Our losses by death during the past year have reached the high total of eighty-three, besides three Honorary Corresponding Members. Among the number are many who distinguished themselves during life either as explorers or for their labours in branches of science allied to geography. Biographical notices of some of these and of other travellers and Gold Medallists have appeared from time to time in the pages of our 'Proceedings,' in the following order:—Sir CHARLES TILSTON BRIGHT (June 1888); Mr. W. GIFFORD PALGRAVE, Mr. W. F. DONKIN, and Mr. H. FOX (November 1888); Colonel N. M. PREJEVALSKY, Gold Medallist; Mr. FRANK T. GREGORY, Gold Medallist (January 1889); Major-General JOHN BAILLIE (April 1889). A large number of the remainder, as will be seen from the list which here follows, had also achieved distinction as travellers, or were eminent in other walks of life:—

Mr. GEORGE ANDERSON (Deputy Inspector-General of Army Hospitals), who died on the 30th of January last. He had served with distinction in the Crimean War; Mr. JAMES B. BROADMEAD, B.A.; Sir JOHN H. BRAND, LL.D., President of the Orange River Free State, who died on the 15th July, 1888; he had been a Fellow of the Society since 1874, and on his visits to England took pleasure in attending our meetings; WALTER BRYANT, M.D.; Mr. EMANUEL BOULCHER; Mr. JOHN BURGEOYNE; Mr. GRAHAM BARBER, one of the great hunters and explorers of the South African interior, who was one of the discoverers of the De Kaap Gold-fields; The DUKE OF BUCKINGHAM AND CHANDOS, who in the course of his long and successful career as a statesman held, in 1867-8, the post of Secretary of State for the Colonies, and in the years 1875 to 1880 that of Governor of Madras; Mr. M. BUGLE; Mr. BERNARD CRACROFT, the well-known writer on political and economic

science, who died on the 29th May, 1888; Mr. W. M. CAMERON; Mr. RICHARD COCKERTON; Colonel ARTHUR C. W. CROOKSHANK, C.B., who met with a soldier's death last September whilst leading the fourth column of the Expedition against the Black Mountain tribes on the north-western frontier of India; Mr. ROBERT CAMPBELL; General Sir DUNCAN A. CAMERON, G.C.B., an officer who led the 42nd Highlanders (the Black Watch) in the battle of the Alma, and commanded the Highland Brigade at Balaklava; he was also engaged on the expedition to Kertch, and at the siege of Sebastopol, and in the assault of the Redan; he served afterwards in the Maori war in 1863-5, and was Governor of the Military College at Sandhurst from 1868 to 1875; Sir FRANCIS HASTINGS DOYLE, Bart.; Mr. THOS. DINEEN; Admiral BYRON DUBRY, who nearly at the commencement of his naval career in 1835 took an active part in the siege of Pará in Brazil, and afterwards in the ship *Alligator* assisted in surveying the harbour of Port Essington, in Northern Australia. He was engaged during the Chinese war in surveying the channels of the Yang-tze-Kiang, and afterwards, when captain of the *Pandora*, was employed for four years and a half in the New Zealand Survey. He had been a Fellow of the Society since 1846; Colonel FRANCIS DUNCAN, R.N., LL.D., F.G.S., &c.; Mr. JOHN DUNCUFT; Hon. GUY C. DAWNSAY, who was killed by a wounded buffalo in Masailand on the 28th February last. His love of adventure, which had led him into the interior of equatorial Africa, had earlier in his career prompted him to undertake a hunting expedition into the interior of South Africa, during which he acquired a knowledge of Zululand and its people, which led to his appointment as Intelligence Officer on the Staff during the Zulu war; he also served as a volunteer in Egypt and at Suakin from 1882 to 1885; Colonel CHARLES ELLIOT, C.B.; Captain W. J. EASTWICK, the distinguished Indian officer and member of the Indian Council (from 1858 to 1868), who died on 24th February last at the age of 80; Colonel G. P. EVELYN; the Marquis of ELY; Mr. JOSEPH FOTHERGILL; Mr. C. R. FENWICK; Admiral the Hon. Sir E. A. J. HARRIS, K.C.B., who had filled in his time various diplomatic posts in distant countries, as Chargé d'Affairs in Peru and Consul-General in Chili, and was made Knight Commander of the Bath in recognition of his civil services; Mr. S. HARWOOD; Mr. JAMES HUGHES; Mr. GAVIN HARDIE; Mr. ARTHUR T. HOLROYD; Lord HATHERTON; Colonel JAMES HOLLAND; Mr. HUGH JAMIESON; Rev. JOSEPH JORDAN; Dr. GEORGE JOHNSTON, ex-President of the College of Physicians, Dublin, and author of numerous medical treatises; Right Hon. Sir HENRY S. KEATINGE, Solicitor-General in 1857 and 1859, and afterwards Judge of the Common Pleas; DUNCAN C. KENNEDY; Mr. J. H. KERRY-NICHOLLS, known as a traveller, and the author of the 'King Country,' a record of his journey in the interior of the Northern Island of New Zealand in 1883; he read a paper on the same journey to the Society in February, 1885, which was published with the map furnished by him in the 'Proceedings' for that year; Mr. PATRICK MACINTYRE; Mr. OLE PETER MÜLLER; M. V. A. MALTE BRUN, son of the renowned geographer of the same name, whose works he edited. He devoted the greater part of his life to geographical literature, and was the author of very numerous treatises on the subject. He was elected Honorary Corresponding Fellow of our Society in 1857, and died on the 15th April last at the age of 72; Mr. ALFRED NORTH; Mr. W. JOHNSTONE NEWALL; Mr. W. H. OVERALL, F.S.A.; Sir THOMAS S. OWDEN, Lord Mayor of London in 1877-8; Mr. LAURENCE OLIPHANT, whose romantic and varied career, as traveller, author, journalist, diplomatist, and eccentric philosopher, came to an end on the 23rd December last, when he died in the 60th year of his age. His principal books of travel were, 'The Russian Shores of the Black Sea in 1852, with a Voyage Down the Volga and a Tour through the Country of the Don Cossacks' (1854); 'Minnesota and the Far West' (1855); 'A Journey to Katmandu, the Capital of Nepal, with the Camp of Jung Bahadoor' (1852); and

'The Land of Gilead, with Excursions in the Lebanon' (1880). He contributed also the following geographical papers to the Journal and 'Proceedings' of our Society:—"Notes of a Voyage up the Yang-tsze, from Woosung to Hankow," in 1858 (Journal, vol. xxx.), with chart by Capt. Sherard Osborn; "The Bayanos River, Isthmus of Panamá," an account of an exploration he personally made with a view to ascertaining the practicability of a ship-canal across the Isthmus, in this direction (Journal, vol. xxxv.); "A Visit to the Island of Teusima near Japan" ('Proceedings,' vol. vii. 1863). He was a member of our Council in 1859 and 1860, in 1866 and 1867, and served as Honorary Secretary in the year 1864-5. Mr. JAMES PANKHURST (Vice-Consul at Lausanne); Mr. G. W. PETTER, the well-known publisher; Mr. JOSEPH PRIOR; General W. T. LAIRD PATTERSON; Mr. W. RENNIE; Right Hon. Sir JOHN ROSE, Bart., G.C.M.G., the distinguished Canadian Minister, who took a leading part in the deliberations which led up to the Confederation of the States of the Dominion; Sir SAMUEL ROWE, K.C.M.G., Governor of Sierra Leone, who died at Madeira on his way home on the 28th of August last; he had been for many years connected with the administration of the British West African possessions, and always took an interest in the geographical exploration of the interior, reports on which he occasionally communicated to the Society; Mr. CARL ROSA, the eminent operative *entrepreneur*, who died on the 30th of April last; Mr. R. B. SHERIDAN; Mr. S. SPALDING; Rev. ROBERT SALT-HOUSE; Lieut.-Gen. W. J. SMYTHE, R.A., F.R.S.; General Lord SEATON; Mr. W. F. SCHOLFIELD; Admiral the Hon. J. W. S. SPENCER; Mr. HANS SLOANE STANLEY; Rev. J. F. SCHÖN, D.D., for many years in West Africa as a missionary of the Church Missionary Society. He was the author of a grammar of the Hausa language (1862), a Vocabulary of the Hausa Language (1843), Grammatical Elements of the Ibo Language (1861), and a Dictionary of the Hausa Language, with appendices of Hausa literature (1876), and also, in conjunction with Bishop Crowther, of 'Journals relating to the Expedition up the Niger in 1841' (1842). On returning from his long residence in Africa he was appointed chaplain to the Melville Hospital, Chatham; he died on the 30th March last, at the age of 85 years. Mr. W. R. TAYLOR; Sir RONALD F. THOMSON, G.C.M.G., who was for many years Her Majesty's representative at the Persian Court, and in that capacity was on various occasions employed on special service; when the Shah visited England in 1873, Mr. Thomson was in attendance on him; he retired in 1887, and was succeeded by Sir Drummond Wolff; Captain HARROLD J. B. TORRY; Mr. GILBERT VENABLES, for about fifteen years on the editorial staff of the 'Standard' newspaper; Mr. W. R. WINCH; Mr. ALEXANDER WILSON; Mr. J. LLOYD WYNNE; FREDERICK G. A. WILLIAMS, for many years on the law-reporting staff, and editor of Seton's work on Decrees; Sir J. W. WALROND, Bart.; Captain R. B. LESLIE; Captain E. M. LEYOESTER, R.N., an officer who was long engaged in the surveying branch of the navy, which has contributed so much to the advancement of geographical knowledge; as long ago as 1851 he contributed (through the Admiralty) an excellent paper to our Journal (vol. xx.) on the Volcanic Group of Santorin or Thera in the Greek Archipelago, and in 1852 a paper of similar character on the Volcanic Group of Milo and neighbouring islands in the Aegean, the latter of which was read at the evening meeting of May 10th, 1852; Prof. LEONT LEVI, the eminent statistician, who whilst acting temporarily as Paraguayan Consul in London contributed to the Society's publications a general description of Paraguay; Professor E. TYNELL LEITH, who during his long residence in Bombay made a special study of Indian ethnological subjects; Lieut.-Colonel NASSAU LEES, the accomplished Indian officer, for many years proprietor of the 'Times' of India, and the writer or editor of numerous publications relating to Persian and literature; Mr. C. J. LAMBERT.

A Visit to the Glaciers of Alaska and Mount St. Elias.

By HAROLD W. TOPHAM.

(Read at the Evening Meeting, April 8th, 1889.)

Map and Illustration, p. 468.

To those among my audience who were present two years ago when a paper on the same region was read by Mr. Seton-Karr to the Society, I can, I fear, offer little that is new. They will, however, have, at least this advantage, they know exactly where Mount St. Elias is situated. To those who may not, I will premise that to reach Alaska, they must cross first the Atlantic Ocean to Montreal, and then the American continent to Victoria in British Columbia, and then go up the Pacific coast by sea for a thousand miles, in order to find themselves at Sitka, the capital of Alaska. Not very far from Sitka is Glacier Bay. To the west of this is Cross Sound, and it is to the north-west of Cross Sound that the mountain range lies which it is my purpose to describe to-night.

Into Glacier Bay many large glaciers descend, only one of which, the Muir, has been explored. It is 30 miles long, and its breadth, where it runs out into the sea, is one mile. It is decreasing very rapidly, so rapidly, indeed, that the sailors assert that they can, year after year, clearly distinguish the difference in its size. The height of the ice-wall at the foot of the glacier, where it is washed by the sea, was 319 feet in 1886, whilst last year it was 266 feet, a decrease of 53 feet. The centre of the glacier moves 70 feet per day, which is equal to five miles a year. This will be appreciated better if it is remembered that the Mer de Glace in Switzerland moves $1\frac{1}{2}$ foot per day, and the Aar Glacier 55 feet per year. We went up on to the ice to visit a cairn which the captain of our ship had previously erected for the purpose of ascertaining the rate of motion of the glacier. We found it almost overthrown into a crevasse, so we re-erected it and took sextant bearings from it to various peaks, for use this summer.

As far as Sitka travelling has been easy; but from Sitka to Yakutat, a distance of 250 miles, the traveller must at present take what he can get—canoes, or some sloop or schooner which has been condemned as unseaworthy further south, and has been sent up here to Alaska to end its days—a thing which these boats very often do, and bury their crews with them. It was a craft of this description which we hired, a schooner of 24 tons, with everything about her unseaworthy to a degree.

On July 3rd we left Sitka, our party consisting of Mr. George Broke, Mr. W. Williams an American, my brother, and myself, four Indians, and two American miners. We were seven days reaching Yakutat, but the wearisomeness of the journey was in some degree com-

pensated by the magnificence of the mountain range, stretching from Cross Sound to Yakatat, beneath which we were sailing. The peaks tower above you as you sail by. They reach up to 16,000 feet, the whole of which height is at once presented to the view. There is no obstruction between you and them. Their bases are washed by the sea, into which their glaciers descend. Many of these glaciers are singularly free from moraine. They are exceedingly steep, and are broken up into innumerable icefalls. One glacier in particular was perhaps the most beautiful that I have ever seen. Imagine an amphitheatre high up the mountain, with innumerable very steep glaciers dropping into it from the cliffs above. The basin cannot contain the quantity of ice poured into it, and it overflows in a splendid cascade several thousand feet in height, and broken up into countless blocks of the purest white ice. Not a dark speck is visible; all is of the same purest white. It is just as though you had filled the basin above with millions of the whitest ostrich feathers, and had then, by a superhuman effort, thrust them over the brink.

Thirty miles from Yakatat is the river Altsek. It has several mouths, and at a very short distance from the shore it forms a kind of lagoon, which has been called Dry Bay. There is an Indian village here, and canoes can be taken hence to Yakatat by means of very narrow inland channels. Several portages, however, are necessary. We met a miner who had made the journey by himself in $4\frac{1}{2}$ days. The Altsek river is said to have been explored by the Indians to a distance of 100 miles from its mouth. At this distance it is said to be three miles wide, and to divide, one branch leading towards the east, and the other towards the north, of Mount St. Elias. It is swift, but has been navigated by canoes. Just before it enters the lagoon at its mouth, it passes beneath a portion of the Pacific glacier which descends from Mount Fairweather. The Indians portage across the ice, and launch their canoes above it.

The St. Elias Alps, from Cross Sound to Mount Fairweather, run close to the sea. They then curve inland, and sweep round Yakatat Bay at a distance of about 30 miles from the water. There are many fine peaks, and the eye wanders on from summit to summit till it rests upon the finest effort of all, Mount St. Elias, at the far north-west of the range. Lieut. Allen has stated this peak to be 19,500 feet high. It is believed, therefore, to be the highest mountain in North America; but I shall not be surprised if some of those peaks which are visible from Yakatat, and are far inland, prove to be as high or even higher.

At the north-east end of Yakatat Bay the sea-water flows inland through a narrow passage frequently blocked by ice into a lake known as Disenchantment Bay. This bay is said to be 30 miles long, and to be surrounded by high mountains and great glaciers. Near to the narrow entrance some coal-fields were discovered last summer. The land between mountain and sea at the east of Yakatat Bay bears evidences of

been at one time completely covered with ice. Cape Phipps is an old moraine, and close to Yakatat village is another moraine running across the island. At the shore end of this moraine is a layer about 8 inches thick of what is known as black sand. This is sand containing a quantity of powdered garnets, crushed probably by glacier action. It was yielding \$20 per day of gold to two miners. When the gold was first discovered the miners thought that it was washed up by the sea, and expected to find it all along the shore. Now, however, they restrict their search to the moraine.

To the north and west of Yakatat Bay all is ice. It is a vast plain of ice, stretching back 60 miles or more, and running 80 miles along the coast. At a place 50 miles up the glacier from the bay, we found we were only 650 feet above the sea. This gives a fall of only 13 feet to the mile, but this must be reduced to nine feet when we consider that the ice itself is not less than 200 feet thick. The rate of progress, therefore, of the ice, must be very small, and this is proved by the quantity of scrub and trees which grow upon the terminal moraine upon the top of the ice. The small headland called Point Manby on the maps is a part of this moraine, which fringes the Malaspina Glacier for miles along the coast. The moraine is several miles broad, and is covered with brush of alder and willow, and spruce. 37 miles west of Point Manby is a delta of lowland between the glacier and the sea. Several glacier rivers run through this, the chief of which is the *Yahtsé-tah-hein*, or muddy harbour river. It was upon this delta that we landed. It is exposed to the full fury of the Pacific, and can only be approached in quite calm weather.

On July 13th we left Yakatat village in three canoes. We had had considerable trouble with the Indians before we could hire either men or canoes. The chief made all sorts of promises which he was unable to perform, and we ourselves had to do the same—indeed, if we had presented to the chief all the clothes which we promised him we should have been left without a rag on our backs. Before deciding upon a thing Indians have to do a lot of talking. They talk the matter over with their families, and with the medicine man. Of these last there had been two in the settlement, but one of them, luckily for us, disappeared in a rather curious way. He went out in his canoe halibut fishing, and a very large halibut took his bait—and it took the doctor too. Neither fish nor doctor were ever seen again.

We landed at the delta without much difficulty, as the surf was not very high. We lay prepared in our canoes just outside the breakers, and when at last a big wave came, we concentrated all our efforts to ride in upon it to the shore. The instant the bows touch land every one jumps into the sea, and what appears to be utter confusion ensues. Indians and whites alike snatch at the first thing that comes to hand, and rush with it up the shore to throw it down out of reach of the waves.

The canoes thus lightened of part of their weight are themselves hauled up. Strewed about along the shore are tents and tea, flour and kerosene, a camera and ice-axes, a stove and blankets, pilot bread, rifles, bacon, dried salmon, snow-shoes, and frying-pans—things of all sorts and conditions, thrown anywhere and everywhere along the sands. Stormy weather detained us three nights upon the beach. On the third day we started inland on foot. Our course took us up the Yahtsé-tah river. The bed of this river is composed of mud and sand flats, through which the water rushes in innumerable channels, which are constantly changing their course. There are a number of quicksands, and wading is therefore not only cold but dangerous. It is not safe to camp upon the sand-flats as the river rises very suddenly and covers them. We therefore chose a place in a wood on an island some feet above the level of the river, and pitched our huts upon thick wet moss. The place was not good, and the mosquitoes and stinging flies were execrable, but it was the best place available.

Seven miles from the sea, the river issues from beneath the ice, and it brings with it such a quantity of dirt, that the water is of a greyish-white. The river, where it issues from the ice, is about 50 feet broad, but it divides and sub-divides to such an extent that at its mouth it is about seven miles in width. The west bank is composed entirely of ice. Where the river issues from under the ice, the latter is 500 feet thick, and possesses a moraine several miles wide, the last mile of which, the one nearest the edge of the glacier, is covered with thick brush.

Through this brush we had some difficulty in forcing our way to the open glacier beyond. The best way of describing the moraines upon the Malaspina Glacier is to liken the surface of the ice to a very choppy sea, on to which innumerable stones and rocks have been raised. The depressions are often 100 feet deep. On this moraine we found shale and slate, granite, quartz, with sulphates and pyrites and copper. At the foot of the moraine we washed out some gold.

Almost due north of us was Mount St. Elias, and between it and us lay the Chaix Hills, which block the approach to the mountain. These hills are surrounded by ice. To the west of them lie the Tyndall and Guyot Glaciers; to the east is the Malaspina Glacier. At the south end of the hills the Guyot and Malaspina meet, and Lake Castani lies at the angle of juncture. Into this lake two streams run: one from the west, and one from the east of the hills. From the south of the lake the Yahtsé-tah river makes its escape, and flows for about eight miles beneath the ice. Its track is marked above by a depression between the two glaciers, and along this depression is a deep water-course, along parts of which are banks of mud and sand many feet thick. Lake Castani is sometimes full and sometimes empty, just according as the exits from the lakes above become choked or not with ice-bergs. When the lakes above burst their bonds they send such a volume of water into

Castani, that it in turn breaks loose and discharges itself by means of the sub-glacial river.

High-water mark round Castani is fully 100 feet above the low. On one occasion we were able to cross the bed of the lake. It partly filled and emptied again several times while we were there. I believe that it sometimes discharges itself over the surface of the glacier down the watercourse mentioned above. For several miles up the river to the east there is no means of descending from the glacier, which presents a wall of ice several hundred feet high. Progress up the river is not easy, on account of the constant wading which is necessary. In some places the river-bed must be left and the glacier ascended. The Chaix Hills all along the right bank of this river are covered with vegetation. There are spruce trees and pine, cotton-wood, alder, and willow; besides which there are quantities of flowers—marguerites, ranunculus, lupins, and others.

We found here a small sulphur spring, and we washed out some gold from the river-bed.

The river has its rise from under the ice at the north-east end of the hills. At this point the Libbey Glacier descends from the very foot of St. Elias. It was here that we ascertained our height above the sea to be 650 feet. The Libbey Glacier descends in an ice-fall 1000 feet high, above which the glacier is quite flat and almost entirely covered with stones. A few tributary glaciers such as this will easily account for the great breadth of the moraine upon the Malaspina. We ascended the ice-fall and obtained an uninterrupted view of the mountain, and concluded that it was too steep upon this side to be climbed. We therefore descended to Lake Castani, in order to reach the mountain from the west of the Chaix Hills. The Malaspina Glacier has shrunk away from the hills, and has left a moraine along their sides. Nevertheless, at one place, at an angle formed by a spur of the hills, the glacier is pushing up against the side of the hills and is crushing down the scrub trees and beautiful flowers. So fast is it doing this, that branches of alder, partially covered with stones and quite alive, are peeping forth from under the débris and protesting against the encroachment of the ice. This débris consists for the most part, not of stones brought along upon the surface of ice, but of an old moraine, which is being overwhelmed and crushed, and I believe that this ice is sliding and swelling over the older ice below, so that it can have little or no effect upon the Malaspina Glacier taken as a whole. There are no signs along the edge of the latter down by the mouth of the Yahtsé-tah, that it is either advancing or receding. There are no piles of stones left behind to indicate its retreat, and no trees crushed down to show its advances. The Malaspina is a vast plateau of ice, which cannot be much less than 5000 square miles in extent, and as we have seen that it has a fall of only nine feet to the mile, I think it fair to suppose that it is at rest.

From Castani we ascended the Guyot and then the Tyndall Glaciers, making several camps upon the hills to the west, and after several ineffectual attempts we succeeded in crossing over the ice to the foot of St. Elias, and pitched camp on a small patch of grass and heather, the only green spot on this side of the mountain. All around was rock, ice, and snow. Some thousands of feet above us we could see the most conspicuous feature of the mountain—namely, the so-called crater. Beyond and above the upper rim of this we could just see the summit of the peak. Several ridges of steep rocks ascend from the glacier to the lower rim of the crater, and it was up one of these that we hoped to ascend. These rocks were composed of shale, slate, and quartz grit. No rocks of volcanic formation were found upon the mountain itself. Near the upper rim of the crater we passed a cone of rock shaped like a sugar-loaf, which Williams said resembled the lava cones of Kilauea in Hawaii. It was about eighty feet high, and forty broad at the base, and was composed of numerous stones of irregular shapes, having flat even surfaces, and fitting into each other like mosaic-work. But in the absence of certain knowledge that the cone was volcanic, I am inclined to think that the so-called crater is no crater in the true sense of the word, and that it is not due to plutonic agency. Five only of our party came to this new camp—Williams, my brother, two packers, and myself. Broke, owing to an accident, was most unfortunately obliged to stay at the camp on the other side of the glacier.

We left our Indians, too, over there. They expressed a decided desire to go no farther; they said they were afraid, and spent the greater part of the time during our absence in chanting mournfully. When asked why they chanted, they answered, "Indians have sick tumtum, and want go home." The word *tumtum* means a variety of things, from a bootjack up to the soul. This time it meant "mind, spirit," and implied weariness. They were chanting one night in this way, when some bears came round to the tent and gave them such a scare that Broke had peace for the rest of that night.

We spent two days in trying to find a way up to the "crater," and reached it eventually after an eight hours' climb upon one of the ridges. More than an hour of this had been spent in cutting up a steep ice ridge. We therefore knew that we must try another route, and next day, August 2nd, we slept out 1500 feet above our camp. Our two packers accompanied us thus far. Though strong and willing, they proved themselves unable to climb with packs on their backs, and so our hopes of being able to camp higher up were gone. The things we carried up to this last sleeping place were curious. Besides our packs, one man carried a coffee-pot full of stewed figs, and I carried above my pack a kerosene stove, and in one hand a camp kettle containing cold stewed marmots, which we had slain down below with our ice axes. It had taken us several hours to slay them, but every bit of fresh meat was precious.

One of the packers had a fall. He slipped upon some steep snow and went headlong. His own account of his behaviour was, "I seed I must fall anyways, and if I didn't fall right there I must fall in the *more* rain in front; so I dropped my axe, and then dropped myself." He was not a member of the Alpine Club! We started early next morning, and three hours brought us to the brink of the crater, 7600 feet above sea-level and 5000 above the Tyndall glacier, and another six hours found us at a height of 11,461 feet. We were then on the northern and upper rim of the so-called crater, and we judged the summit to be another seven or eight thousand feet above us. The latter I believe to be the more correct.

The bottom of the crater is full of ice, and upon its precipitous cliffs are a number of overhanging glaciers, splashed, as it were, upon the rocks and detached from the snow-fields above. This is characteristic of a number of the glaciers in the neighbourhood. There they are—right on the rocks, with yawning crevices upon them broken up and ready to topple over upon you. Perhaps in a few years they will have melted entirely away. Everything around St. Elias bears evidence to the conclusion that the long period of ice through which the land has been passing is now coming to an end.

The panorama obtained from the point reached was very wonderful. The distances were immense. To the north-west we could see many ranges of hills with huge glaciers between them. Most of these mountains appeared less than 7000 feet high, but there were several very much higher, and I believe that we saw Mount Wrangel, which Lieutenant Allen states to be 17,500 feet high, the second highest mountain in North America.

The Malaspina Glacier appeared with its moraines like a huge race-course, and the streaks of *débris* at the west end of the course had fashioned themselves into the semblance of Saturn's rings. This glacier filled up the whole space to the east as far as the horizon. Mount Fairweather, distant 150 miles, stood up beyond. To the south we could distinguish the sea and the mouth of the river. The greater part of the Malaspina Glacier, and certainly nine-tenths of the white ice, comes from between Mount St. Elias and Mount Cook. The ice coming from the south of Elias is covered with *débris*, shale, and slate, for the most part such as we had been climbing up. This formation renders climbing very tiring work. No step is quite safe. Whole masses of rocks become dislodged and fall thundering down the mountain side, and so thick was the cloud of dust which enveloped us on our descent, that the last man had great difficulty to see where to walk. There is a couloir about 3000 feet in height, down which stones are continually falling, owing to the rapid disintegration of the mountain. They never cease falling, and a pillar of dust ascends high into the air, giving the appearance, when seen from a distance, of steam or smoke, and the wind plays upon

the dust just as it plays upon the Staubbach and other high waterfalls, wafting it to and fro and sporting with it as it likes. As we approached the mountain from the Tyndall Glacier, we had been under the impression that the pillar of dust was smoke or steam due to volcanic agency, and although we had examined the phenomenon through a powerful telescope, we continued of the same opinion until we arrived close to it and discovered its true nature. The Tyndall Glacier forms a very small part of the Guyot, but most of the moraine upon the latter descends from the southern slopes of Elias. The Guyot Glacier stretches away out of sight to the south. The Chaix Hills are in the shape of a great V. At the angle of the V are snow-fields, connected with a short range of hills of a reddish sandstone. These run north, and connect with St. Elias. On the west side of the Tyndall Glacier are several smaller glaciers descending from the range of hills which flank the Tyndall on that side. The hills are of grey sandstone, shale, and slate. Upon these hills we found many seams of coal, and some fossils of the Miocene, or perhaps Eocene, period on their glaciers. Upon the east lateral moraine we found hornblend, shale, amygdaloid, and some granite.

From where we were upon St. Elias, we could see that a branch of the Guyot Glacier descends from the northward of the peak and passes behind these hills. This fact coupled with that mentioned above, that the greater portion of the Malaspina Glacier appears to come from the north-east of St. Elias, makes me think that the mountain itself is not at the summit of the watershed. This is interesting only to those who are anxious to place Mount St. Elias in Canadian territory, because the boundary, according to treaty, was to run parallel to the coast, at a distance of ten leagues, except where the summit of the watershed came within that zone, in which case the watershed was to be the frontier.

There is vegetation upon the south-east slopes of these hills to a height of 1500 feet above the glacier. The greatest height at which we found vegetation, exclusive of lichens, was 4500 feet above the sea, but the place was exposed to the full glare of the sun, and no other vegetation was found for an interval of 1500 feet below. On the southern slopes I should put the snow-line at about 2500 feet; on the northern it is very much lower. The plants found at the greatest height were *Sedum*, *Polemonium*, *Campanula lasiocarpa*; the latter is only found in North-west America. Lower down were *Veronica alpina*, *Epilobium alpinum*, *Saxifraga tricuspidata*, *Arnica montana*, *Trientalis Americana*, a small heath, *Platanthera dilatata*, asters, strawberry plants, lupins, red columbines, spiraea, white ranunculus, *Mimulus luteus*, spruce, *Epilobium latifolium*, *Viola palustris*, salmonberries, currants, cotton-wood, and *Veronica serpyllifolia*. I must not forget devil's club (*Fatsia horrida*), the most difficult plant to get around that I know.

The glaciers which descend on the west of the Tyndall are consider-

ably lower than the latter at their junction with it. The Tyndall actually drains on to its tributary glaciers, and the water then runs away below the former. The Tyndall is itself considerably lower than the Guyot at their juncture, which is marked by a regular high bank of ice stretching across the glacier. This bank marks the higher level of the Guyot Glacier. This suggests that all the glaciers are disappearing, but that the smaller ones are the first to go.

A characteristic of these Alaskan glaciers is the curious way in which small isolated bits of moraine show up here and there above the ice. For example, you may walk down the centre of the Tyndall upon white ice without seeing more than a few stones to suggest the existence of a moraine, and suddenly you will come upon an island of *débris*, disconnected from any regular moraine. It springs from nowhere, is quite isolated, and appears to have no reason for being there. Upon the Malaspina are such islands, which must be 100 feet high.

At the foot of the ice-fall of the Guyot near Castani, there is a quantity of glacial mud, which collects in hollows and terraces upon the ice. The mud is covered with stones, which cause you to think that the surface is hard, but when you tread upon it you find your error, for you sink to your knees, and have difficulty in getting free.

The highest point we reached was 11,461 feet. Our heights were taken by boiling-point thermometers and aneroid; the latter at our highest point registered 86 feet lower than the thermometers. I think the next expedition to the mountain should try to ascend from the north; but the traveller should start from Sitka fully provided with everything he needs until his return, and must be quite independent of fresh food. I was told subsequently, by George, the second chief at Yakatat, that he had once made a journey after goats towards the north of the peak, and that the northern sides were much less steep than the southern, and were covered with snow. He landed further west than we did, near a river similar to the *Yahtsô-tah*, and made three days' journey inland over ice. It is characteristic of the Indian character that he never said a word of this till our return to Yakatat. Until the Indians are sure of your good intentions, they will give you no help. I learned, too, from George, the origin of the name *Yahtsô-tâh*. There is a tradition amongst his people, that formerly there was a large bay running up from the sea to the very foot of St. Elias; that there was a village at the head of that bay; that all around the village was swampy or muddy (*Yahtsô*) ground; that the mountain was therefore called *Yahtsô-tah-shah*, *tah* meaning harbour, and *shah* meaning peak; that a river flowed into the bay from the north-west, where were large glaciers; that the east of the bay was all ice, but the west, sand and trees; that at the mouth of the bay dwelt some Indians, and that one day an Indian came rushing home crying "Quick, quick, the ice is coming," pointing to the river down which the ice was seen

to be rapidly advancing. The Indians escaped along the shore. The ice came on right across the bay, till it struck the opposite shore, when it turned and continued down the bay to the sea, swallowing the village in its course.*

Our natural history collection was not very great, but then very few animals will condescend to live upon ice. We saw wolves and several bears; upon the Chaix Hills we found a shrewmouse and a char. This last was in a rivulet running into Lake Castani, and to arrive here that fish had had to force its way up the river beneath all those miles of ice. But there is no accounting for taste, and perhaps, if asked its opinion, the fish would have said that swimming beneath the ice was just as sensible as walking above it.

Ptarmigan are very plentiful on the hills, and we killed a number of brent geese.

On our way down to the coast we slightly varied our route by keeping entirely upon the Guyot Glacier which we found very much easier to walk upon than the Malaspina. It is not broken up to the same extent and its moraines are much less extensive.

We got back again to Yakutat on August 8th, and were detained there for several weeks, owing to the non-arrival of our schooner. Eventually some of the party descended the coast in a canoe and sent up a schooner from Sitka to fetch those left behind, who after a narrow escape from shipwreck reached Sitka upon the 17th of September.

After the reading of the above paper—

Mr. D. FRESHFIELD said that he had been furnished by Mr. H. W. Seton-Karr, who, it would be remembered, had described two years ago to the Society his visit to Mount St. Elias and the shores of Alaska, with a note on the position of Mount St. Elias with regard to the British American frontier-line, the purport of which was to show that the American claim to the mountain was still more than doubtful. Mr. Seton-Karr—who had just sailed for South Africa—wrote as follows:—

"I should be glad if I might be allowed to make a few remarks upon the topographical position of this, the highest mountain in North America; the highest, since Lieut. Allen (who ascended the Copper river in 1884) has reduced his estimated height of Mount Wrangel from 20,000 feet to something considerably lower than St. Elias; as given in the published account of his journey, St. Elias is, therefore, the undisputed monarch of the North American Continent.

"The international boundary between Alaska on the one hand, and the British Colonies of Columbia and the North-west Territory on the other, is fixed by treaty to follow the watershed along the coast where that watershed is within a distance of ten leagues of the coast. At points where the watershed is not within that zone the boundary line is to run parallel to the coast, at a distance from it of ten leagues; it then follows the 141st meridian of longitude from the point of intersection northwards to the Arctic Ocean.

* This tradition seems to point in a confused way to the breaking up of some glacier lake, causing a catastrophe similar to those in the *Ötztal* and *Val de Bagnes* in the Alps and the *Devdoraki Glacier* in the *Caucasus*.—D. W. F.

"If then St. Elias is west of this degree of longitude it belongs to the United States. If east of it and within 30 miles of the coast, then half must belong to Canada's North-west Territories. If the mountain is over thirty miles distant from the coast, then Canada can claim the whole.

"Mr. Topham's party, Mr. Schwatka, and myself are agreed in placing it over thirty miles from the coast. But this would not make it British unless it is also east of the 141st meridian. On this point I offer the following arguments:—Vancouver in his travels, states that the length of time he had remained within sight of Mounts Fairweather and St. Elias, had afforded him many opportunities for observations for ascertaining their situation. That of St. Elias he gives as lat. $60^{\circ} 22' 30''$, and long. $139^{\circ} 39'$. The other navigators (I am not aware whether or not without exception) also place the mountain east of the present international boundary. In 1874 the U.S. Coast Survey observed a series of vertical angles from Yakutat about 60 miles distant, on Mount St. Elias. Their triangulation fixed the position of the mountain as lat. $60^{\circ} 22' 6''$, and long. $140^{\circ} 54' 00''$, or within six minutes of the boundary. This position was incorporated in Professor Davidson's 'Coast Pilot of Alaska,' he being head of the Coast and Geodetic Survey. As I believe these were the only observations taken, and as there have been no later ones, it requires to be explained why the position of St. Elias was subsequently shifted. In the next edition of this volume, which is called 'The Pacific Coast Pilot,' and bears the date of 1883, Mount St. Elias is forced to make a fresh jump, and this time clear over the boundary. This new position, for which no reasons are given, is lat. $60^{\circ} 20' 45''$ N. and long. $141^{\circ} 00' 12''$, or just 12 seconds over the line, and—needless to say—on the American side.

"When I landed at San Francisco, in 1886, from Alaska, the newspaper editors asserted that any statement questioning the claim of the United States to Mount St. Elias would adversely affect their circulation and inflict an injury upon their reputation, so I was compelled to say nothing about it. But Mr. Dall himself, after reading my paper in the 'Proceedings' of the Society, wrote from the Department of the Interior, dating his letter May 25th, 1887 (published in 'Proceedings,' vol. ix. p. 444) admitting that the position of the summit was still a matter of controversy, "within two or three miles, or in all probability less than one mile." I would also quote the following single sentence from Mr. Dall's letter, 'The shoreline of the Alaskan coast between Yakutat and Prince William Sound, is not, and never has been correctly located.'—H. W. SEaton-KARR.

Mr. FRESHFIELD continued:—The Horatian maxim, "*Si possis rectè, si non quocumque modo, rem,*" may be in favour with Californian newspapers but it will hardly be adopted by the scientific staff of a great nation—even for the sake of acquiring so big a "rem" as Mount St. Elias! We might trust the accurate observers of the U.S. Survey to furnish us, before long, with observations that would be decisive of the rival claims, which reminded him of those now being urged in France and Italy with regard to the actual crest of Mont Blanc. He felt assured that the Alaskan coast—in some respects the grandest in the world, where mountains loftier than the Alps rose close to the coast-line and sent down their glaciers to meet the waves of the Pacific Ocean—would, before long, become a pleasure-resort for the enterprising Americans of the Far West. Science should be the gainer; for nowhere will glacial action, on a great scale, be better studied in many of its features. The region is still in the state of Switzerland in the last glacial period, and the present retreat of the Alaskan glaciers, described by Mr. Topham, may enable observers to judge for themselves whether these great ice-streams have exerted, or are exerting, such erosive action as has been attributed to their extinct Alpine predecessors. He had touched on the question of glacial erosion (which many of the best geologists consider settled in

the negative, but which some geographical text-books still treat in a very different spirit) in a recent paper in the 'Proceedings' (December 1888), the arguments of which he would not repeat. He finally called attention to the fact that the outline of Mount St. Elias, shown in photographs, had none of the characteristic features of a volcano. He felt convinced that whatever traces of volcanic action might be found in its vicinity, the mountain itself was not of direct volcanic origin. This conclusion he found had been anticipated from local knowledge, fourteen years ago, by Mr. Dall, in a Report on Mount St. Elias, &c.,* and it was high time, therefore, the fiction was dismissed. With regard to the alleged eruptions in 1839 and 1849, referred to by Mr. Dall, he might mention that similar legends were not infrequent. An eruption of Ararat had been imagined on the strength of a great rockfall in the present century. In the last century (1751) Donati was sent from Turin to report on a new volcano said to have broken out in Savoy. The catastrophe was, in reality, a great landslide from the Rochers des Fyz, near Servoz; the facts are recorded by De Saussure ('Voyages,' vol. ii. p. 414). Mr. Freshfield had himself, in 1867, from the chain of Mont Blanc, some twenty-five miles distant, seen the dust rising to heaven like a cloud of smoke from a great earthfall which took place near the Little St. Bernard Pass. The hillside continued to fall, and consequently the dust-cloud to rise, for several weeks, and no observer at a distance would have guessed its nature and origin.

GEOGRAPHICAL NOTES.

Dr. Nansen.—The crowded meeting of the Society on June 24th was evidence of the great interest which is taken in Dr. Nansen's recent journey across Greenland. That journey is regarded by Dr. Nansen himself as little more than a reconnaissance. Now that he has proved that the difficulties of crossing the ice-bound country from east to west can be overcome by skill and determination, he means to attempt a similar journey much further north, at the broadest part of Greenland. Dr. Nansen will land on the east coast, about Franz-Josef Fjord, in autumn (probably next year), and select a suitable locality for wintering. As opportunity permits, he will explore the unknown coasts of East and North-east Greenland, and as early in the following summer as possible will proceed to make his way to the west coast, his destination being some point to the north of Disco.

Danish Exploration in South Greenland in 1888.—The southern part of Greenland was explored last summer by Professor Steenstrup, the well-known geologist, and M. K. Rosenvinge, a botanist. The travellers started from Godthaab and proceeded by boat down the coast. Frequent compulsory stoppages enabled them to study the coast in detail. Quantities of marine algæ were collected everywhere, and on the glacier of Frederikshaab snow algæ also. From the 20th to the 27th June the

* 'Report on Mount Saint Elias, Mount Fairweather, and some of the adjacent mountains, by William H. Dall, Acting Assistant in the United States Coast Survey, in Report of the Superintendent of the United States Coast Survey, during the year 1875,' pp. 162-3.

neighbourhood of Ivigtut, as far as the limit of the inland ice, was geologically and botanically explored. The town of Narsak, the objective of their journey, was reached by the travellers about the middle of July. The results of the expedition are not yet to hand.

The Colonisation of the Trans-Caspian Region.—In a lecture recently delivered before the Russian Geographical Society, General Annenkoff made the following interesting remarks as to the possibility of colonising the Trans-Caspian region and of developing there a successful agriculture. He pointed out the wide development of fertile loess in the region. In fact, it appears from a geological map made by MM. Bogdanovitch and Obrutcheff under the supervision of M. Mushketoff, that a broad belt of loess, interrupted but in a few places by sands, stretches along the foot of the Kopet-dagh from Kyzyl-arvat to Askhabad, and further east all along the Atrek. Several borings have shown that the thickness of the loess reaches several hundred feet, and the chemical analysis of Trans-Caspian loess proved that its composition is identical with that of the loess in China. Its fertility, under proper irrigation, is really astonishing. Thus the Turcomans, who are worse agriculturists even than the inhabitants of Bokhara, nevertheless gathered, in the oasis of Merv, crops which gave the almost incredible yield of 170 to 1. As to the sands, which surely are an obstacle to agriculture, it must be observed that though they cover wide areas, the areas covered with loess are still immense. Besides, if the invasion of sands is really to be feared in some parts of the territory, the fault is with man himself, in consequence of the reckless destruction of vegetation on the *barkans* (sandhills) in the neighbourhood of the settlements. At a certain distance from the villages the barkans are fully covered with a thick vegetation of *saksaul* (*Anabasis ammodendron*) and various grasses which grow under its protection; and since it has been prohibited to cut the saksaul and other bushes within a distance of three miles from the Trans-Caspian railway, the barkhans, formerly devoid of vegetation, have rapidly been covered with bushes and grass. It is evident that the sandy tracts can also be planted with certain bushes, especially those which are thriving in the region in a wild state. Since the experiments in planting imported species of bushes and trees have proved unsuccessful, the administration of the railway has given a great deal of attention to the propagation of saksaul, and these attempts have proved a success. Plantations of trees have also been made on the new domains of the Czar and about Samarcand; and General Annenkoff has great hopes in the canal—long since planned in Bokhara—which would supply Karakul with water drawn from the Amu-daria. "When one sees," General Annenkoff remarks, "the Amu-daria flowing at Chardjui in a stream four versts wide (2·7 miles) at a speed of 6½ miles in an hour, one cannot but think that such a scheme is quite realisable, and its accomplishment would mean a revival of civilisation in the Karakul region where the loess soil is the richest in the

whole of the valley of the Zerafshan. As to the yearly amount of rain in the Trans-Caspian region, it appears much greater than it was formerly supposed to be. Thus, in Merv, the amount of rain fallen during the three last months of 1885 and the four first months of 1886 (which may be considered as representing the annual amount, as summer rains are exceedingly rare) reached the very high figure of 65 inches, thus exceeding the yearly average amount of rain in Great Britain. That amount of water, falling during the winter and spring, surely would not prevent the summer droughts, if no irrigation were resorted to; but the rivers Tedjend and Murghab which are now lost in the sand-deserts, as well as the Amu, could supply the necessary amount of water for irrigating wide areas, provided a reasonable system of irrigation be introduced. General Annenkoff concluded his lecture by the remark that even now there is no lack of Russian peasants willing to emigrate into the newly annexed territory; some of them already have come to settle there, but they do not yet know how to select the lands which are appropriate for irrigation, and they are totally unacquainted with the local methods of agriculture. But careful surveys, irrigation on a small scale, consisting in reopening canals and improving the existing ones, and model agricultural stations will be of great service to the immigrants.

International Colonial Conference.—Among the International Congresses to be held in Paris during the time of the Exhibition, will be one on subjects connected with colonisation; it will meet on July 30th at the Trocadero. The subjects to be discussed are divided into two groups:—First, General Theory of Colonisation; Second, Applications. The first section of the first group will deal with the population and the products of colonies, and will be under the presidency of M. Gauthiot. Among the questions to be brought forward are: the Social Condition of Colonial Populations; Aptitude of the Indigines for Civilisation; Hygiene and Acclimatisation; Colonial Culture, Industry, and Commerce. The second section will be the general subject of Colonisation, and will be under the presidency of Admiral Thomasset. Among the questions to be considered are Native Labour, Free Immigration, the Land, Means of Communication. The third section will deal with Colonial Administration, and will be presided over by M. Félix Faure. Under the Second Group—Applications—are two sections, one dealing with the various French Colonies, and the other with the Colonies of G.

A Journey into the interior of Gaboon.—M. de at a recent meeting of the Geographical Society with reference to an important expedition carried M. Crampel, into the hitherto unexplored country west of the Ogowé. M. Crampel, with a party armed with guns, two Senegalese, and a d. Madiville on the Ogowé on the 12th Augu

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to the north, somewhat to the west of that taken by M. G. de Brazza on a former occasion, arrived on the 1st October on the Upper Ivindo, the largest of the tributaries of the Ogowé. The course of this river, except at its mouth and its extreme upper part, has never been determined. The Pahuins who inhabit this part were friendly, and the traveller deposited his baggage with one of the chiefs, while he pushed on in a north-easterly direction in order to explore the watershed of the Congo. At $2^{\circ} 15'$ N. lat. he reached the upper course of the river Lekoli (? Likuala) which empties itself into the Congo at Bonga. This line forms the boundary of the French and German possessions in this region, and was the furthest point north reached by him. M. Crampel then turned westwards and struck across the unknown region lying between him and the coast. On his route he discovered a stream flowing westwards called N'Tem, which he supposes to be the upper course of the Campo. The French traveller Fleuriot de Langle mentioned a Lake N'Tem as the original home of the Pahuins, doubtless confounding it with this river. It was at this point that M. Crampel, whose relations generally with the inhabitants had been of an amicable character, had an encounter with the natives, in the course of which he was wounded and lost one of his Senegalese. He regards the action of the natives as the result of prior conflicts with two German expeditions. After considerable difficulties, he made his way to the coast, arriving at Bata on 3rd March last. There is no doubt that the results of this journey will add greatly to our knowledge of the country traversed, and fill up to some extent what is now a blank on our maps.

The Altitude of the Victoria Nyanza.—Mr. Ravenstein writes:—The statements as to the altitude of Victoria Nyanza are still very conflicting. Mr. Mackay, who observed in May 1855 at the Uganda station, as also at Mtungo on Murchison Bay, four feet above the lake level, gives the lake an altitude of only 3250 feet, which was surprisingly low. Mr. Mackay observed with a George's barometer, and as he gives his readings in the 'Church Missionary Intelligencer' (1885, p. 723), I have been able to compute his observations with the following result:—

Uganda station	4089 feet.
Mtungo (4 feet above lake-level) ..	3901 feet.

I have also carefully computed Mr. Thomson's observations at Masali, stated by him to lie 20 feet above the lake-level. He too had a George's barometer. I make his altitude 3892 (lake 3872) feet, which agrees in a most satisfactory manner with Mr. Mackay's result. Of course, these isolated observations may not be free from error, but I believe they justify us in reducing the level of the lake from 4000 feet, which I gave it in my large map, to 3880 feet—a difference, after all, not very serious. As Mr. Mackay's meteorological journal has safely reached England, we shall probably have more definite information on this point at an early date.

Exploration in Tibet.—According to the *Chinese Times* of April 20th, Mr. W. W. Rockhill, late Secretary of the American Legation in Peking, is at present travelling in the Koko-nor region, mainly for the purpose of ethnological investigation. In a letter dated from Lusa (Kumbun), near the Chinese city of Sining, February 16th, he states that there is a large party leaving for Lhasa shortly after, and, with the help of a friendly Mongol, he hoped to join the party at Tsaidam. If he should be able to do so, he felt sure of reaching Lhasa. Mr. Rockhill speaks Tibetan, and wears Tibetan dress, and so far he had excited no suspicion and met with no difficulties. He had engaged Potanin's head man, who travelled with that Russian explorer two years. Kumbun, Mr. Rockhill states, considering its altitude (9000 feet) is wonderfully warm as long as it is not cloudy.

The Results of M. Coudreau's Exploration of the Tumuc-Humac Mountains (Guiana).—At the meeting of the Geographical Society of Paris held on the 24th of May, M. H. Coudreau gave an account of his mission of exploration in the Tumuc-Humac Mountains in the interior of French Guiana, a region almost completely unknown until the visit of the late Dr. Crevaux in 1877-9, which, however, only resulted in a partial exploration of the main features of the country. It will be remembered that M. Coudreau successfully accomplished in 1883-5 a similar mission in the countries bordering the French possessions in Guiana on the east, south, and south-west. The results of his second expedition, which lasted from May 1887 to April 1889, are stated by him to be as follows:—A survey, on the scale 1:100,000, was effected of 2500 miles of routes, 1625 miles of which lay along river-courses and the remaining 875 among the mountains. A complete survey was executed of the courses of the Maroni, Oyapock, and Maruni, from their mouths to their sources. His work in the mountain district involved 210 days' marching on foot, of which 160 were spent in following the Indian paths in the virgin forest, and 50 in the trackless part of the forest, where a passage had to be hewn out. Measurements were made of 150 summits, and the sources of nearly all the watercourses of both slopes of the range were fixed. The climate of these highlands is healthy; the mean temperature being about 72° Fahr. Immense forests cover a large belt of country at the foot of the mountains. From an ethnographical point of view M. Coudreau's mission has resulted in the careful study of the manners, customs, and dialects of the score or so of Indian tribes inhabiting this region, whom for the most part he found to be intelligent, pacific, sedentary, industrious, and devoted to agricultural pursuits. A small tribe of the Cussaris proved hostile and, in an attack, wounded him. M. Coudreau was accompanied throughout part of his journeys by a small escort of two or

CORRESPONDENCE.

The Hydrography of South-eastern Tibet: the Dibong River.

SADIYA, 6th May, 1889.

I have only just read General Walker's paper, published in the 'Proceedings' of the Royal Geographical Society for September 1888, or I would, undoubtedly, have noticed earlier what he has said regarding the identity of the Kenpu and Dibong.

Being aware that some geographers at home assume that the source of the Dibong lies *very far* to the northward of this place, I have lost no opportunity, during the six years I have been stationed at Sadiya, of making very careful inquiries about the subject, and I am convinced that this theory is incorrect.

I am personally acquainted with dozens of Mishmis (Chulikattas, Bebejias) residing at different spots on the Dibong (beyond the gorge at Nizamghat), who have repeatedly assured me that they pass in close proximity to its source every time they visit the Tibetan town of Álúpó, which lies on the northern slope of a high range (Himalayas) separating their country from Tibet. This range is known to the Mishmis (in the vicinity where they cross it) as Tasení, and from it the Dibong takes its rise. Tasení can be reached in eleven marches from Nizamghat. They are as follows :—

Nizamghat to Angólí.	
Angólí	„ Kalidoí village.
Kalidoí	„ Endólí. <i>Note.</i> —The n is silent in Mishmi.
Endólí	„ Étání.
Étání	„ Áhonlí.
Áhonlí	„ Chípá.
Chípá	„ Chénlí.
Chénlí	„ Báthéní.
Báthéní	„ Lámá.
Lámá	„ Ééndon.
Ééndon	„ Tasení mountain

} At this spot the Dibong is only ankle-deep.

The route lies all the way alongside of, or in close proximity to, the Dibong. The Dibong then may be said to have a course of about 130, or, at most, 140 miles from its source to the gorge at Nizamghat, and the distance from that spot to the one where its discharge is said to have been measured is about 36 or 40 miles.

I may add that I am in hopes of being able, some day, to trace the Dibong to its source. I solicited permission to do so this year, but, unfortunately, our relations with the tribe of Mishmis, through whose country I should have to travel, have been so strained for some time past that the Chief Commissioner considered it prudent to refuse my request.

Before concluding this note, I feel bound to make the following remarks anent Colonel Tanner's account of the lower course of the Yaro Tsanpo alluded to by General Walker in his paper under notice.

I have very recently seen K. P., and having had an opportunity of closely questioning him (in the presence of some Abor head men who know the whole of the country well from this to a place called Simong), I am convinced that he did not descend the river Dibong, for *any distance*, south of Gia la Sindong. In the first place there is no Abor village called Miri Padam. The Abors proper call themselves Padams, but their territory is several days' journey to the eastward of the Dibong. It is quite possible that K. P. heard of these people from those he was amongst. In cross-examination K. P. was asked if he had been to Simong, the

capital of the tribe, lying north-west of the Abors proper (i. e. the Padams), and he said yes ; on being asked to describe the place, he said the village is on a very high hill and close to the Dibong, whereas, as a fact, Simong is not on any hill and is a long way from the Dibong. He was then asked what food the people ate, and replied rice, whereas little or no rice is grown there. The people live on a kind of grain which is grown between stones, and any one having been there could not have helped noticing this fact.

J. F. NEEDHAM,
Assist. Political Officer.

Obituary.

Major E. A. de Cosson.—We much regret to announce the death, on the 5th of June, of Major de Cosson, at the early age of 39, at his residence, Southfield House, Frome, Somerset. He was descended from an ancient French family, established in the south of France until the Revolution, when his grandfather emigrated, serving first in the army of the Princes and then in the Hompesch regiment of Hussars, which becoming the 10th Hussars in the British army, he came with it to England. In 1873 Major de Cosson, after wintering in Egypt, started for Suakin with his brother, the intention of the travellers being to seek for sport in the country described in Sir Samuel Baker's 'Nile Tributaries of Abyssinia,' but meeting on the way with General Kirkham, of the Abyssinian army, who was returning with a letter from Queen Victoria to King John of Abyssinia, they decided on visiting that monarch and his country. They visited Adowa, Gondar, and Lake Tsana, near which they found King John established with his army.

Major de Cosson obtained from the "King of Kings" a written promise to the British Government that he would endeavour to stop the slave trade in his kingdom.

Major de Cosson's military duties recalling him in haste to England, he rode with one Egyptian servant to Khartum, and thence across the desert to Suakin, enduring considerable hardships on the way. His brother returned by a slower route through the interior of Abyssinia to Massowah. Major de Cosson published an account of his journey in a book entitled 'The Cradle of the Blue Nile.'

The special knowledge of the desert route from Suakin to Khartum gained on this journey, caused Major de Cosson to place himself in communication with the War Office when the relief of Gordon was decided on, and he strenuously advocated the choice of the Suakin-Berber route to Khartoum.

When the Suakin expedition was decided on in 1885, Major de Cosson, who was in the reserve of officers, volunteered for active service, and was attached to Sir Gerald Graham's field force at Suakin in command of the water transport.

He was present at the Battle of Tofrek (M'Neill's zareba), where his horse was shot under him. He was mentioned in despatches, and gazetted Major on his return from the Egyptian campaign.

He published an account of this expedition in a work entitled, 'Days and Nights of Service.' He also contributed occasional articles on Egypt and Abyssinia to the reviews, and in March of last year read a paper on 'Land and Water Transport in the Soudan and on the Nile,' at the Royal United Service Institution.

The deceased gentleman was married on March 11th, 1879, at Weymouth, to Eliza, daughter of George Morant, Esq., late of the Grenadier Guards. He had been a Fellow of our Society since 1873.

THE ANNIVERSARY MEETING, MAY 27th, 1889.

General R. STRACHEY, R.E., F.R.S., President, in the Chair.

ELECTIONS.—*Alfred Bentley, Esq.*; *Lieut.-Colonel Birkett* (Natal Royal Rifles); *Alex. L. Bruce, Esq.*; *F. A. Campbell, Esq.*; *William Colley, Esq.*; *William Richard Dunstan, Esq.*; *Sherard Haughton Goldman, Esq.*; *George Richard Hemmerde, Esq.*; *Edward Francis Henley, Esq.*; *The Earl of Jersey*; *William Kelly, Esq.*; *Peter Lee, Esq.*; *Geo. Sutherland Mackenzie, Esq.*; *Henry Yule Oldham, Esq.*, n.sc. Oxon (Director Geol. Survey of India); *Philip Francis Payn, Esq.*; *Capt. Henry Pelham-Burn* (Rifle Brigade); *Daniel Lewis Poole, Esq.*; *Admiral J. Child Purvis*; *Rev. Jelinger Edward Symons*; *Harold Ward Topham, Esq.*; *Benjamin James Warwick, Esq.*; *William Warren, Esq.*; *John Maurice Wingfield, Esq.* (Coldstream Guards).

The proceedings commenced by The Secretary (Mr. D. W. FRESHFIELD) reading the rules relating to Anniversary Meetings, after which the Minutes of the last Anniversary Meeting were read and confirmed.

The PRESIDENT then appointed Captain TELFER and Mr. DYASON Scrutineers of the Ballot.

The Annual Report of the Council was next read.

REPORT OF THE COUNCIL.

The Council have the pleasure of submitting to the Fellows the following Report on the financial and general condition of the Society:—

Members.—The number of Fellows elected during the year (ending April 30th, 1889) was 178, besides three Honorary Corresponding Members. In the previous year, 1887–88, the total elections amounted to 171, and in 1886–87 the number was 206. Our losses have been, by death 83 (besides 3 Honorary Corresponding Members), by resignation 58, and by removal on account of arrears of subscription 58; making a decrease for the year of 21. In the year 1887–88 there was a decrease of 29; in 1886–87 an increase of 25. The total number of Fellows on the list (exclusive of Honorary Members) on the 1st May was 3352.

Finance.—As will be seen by the annexed Balance Sheet, the total net income for the Financial year ending 31st December, 1888 (i.e. exclusive of balance in hand), was 8053*l.* 5*s.*, of which 5976*l.* consisted of entrance fees and subscriptions of Fellows. In the previous year, 1887, the total net income was 8007*l.* 16*s.* 3*d.*, and the amount of subscriptions, &c., 5861*l.*; in 1886 the two totals were 7968*l.* 9*s.*, and 5859*l.* respectively.

The net expenditure for the past year (i.e. exclusive of balance in hand) was 7908*l.* 18*s.* 6*d.* The net expenditure in 1887 was 8493*l.* 10*s.* 3*d.*; in 1886, 7767*l.* 18*s.* 0*d.*

The Finance Committee of the Council have held, as usual, Monthly Meetings during the year, supervising the accounts of the Society. The Annual Audit was held on the 27th of March last, the Auditors being, on behalf of the Council, Sir Rawson W. Rawson and Sir Henry Barkly, and on behalf of the Fellows at large, E. O. Tudor, Esq., and J. Duncan Thomson, Esq. The cordial thanks of the Council and Fellows are due to these gentlemen for having freely devoted their valuable time to this important task. At the end of their labours the Auditors drew up the following Report to the Council:—

Auditors' Report.—"The Auditors appointed for the examination of the Accounts

of the Royal Geographical Society for the year ended 31st December, 1888, have examined the Balance Sheet submitted, and have compared it with the several Account Books and vouchers, and have found it to be correctly stated and sufficiently vouched. They have satisfaction in being able to repeat their approbation of the manner in which the Accounts have been kept and rendered.

"The Investments remain unchanged. They amount to 19,568*l.* 12*s.* 4*d.*, and are composed of the following sums:—

	£	s.	d.
Davis Bequest	1800	0	0
Murchison Bequest	1000	0	0
Gill Memorial	1028	5	6
Peck Grant	1000	0	0
Back Bequest	561	0	8
Trevelyan Bequest	510	4	0
Miscellaneous	13,669	2	2
	<hr/> £19,568 12 4 <hr/>		

"The Balance Sheet is in every respect satisfactory. The receipts under almost every variable head have been maintained or slightly increased; they have sufficed to meet the expenditure, and to increase the balance at the close of the year, as compared with the amount at the beginning, by 144*l.* The expenditure shows a decrease on last year of 584*l.*, of which 420*l.* is accounted for by a reduction under the head of Expeditions. There has been an increase of 650*l.* on Maps in the 'Proceedings,' Medals and other awards, and the publication of a Part of 'Supplementary Papers, which has been counterbalanced by a corresponding reduction on Repairs and Furniture, expenditure in the Map-Drawing-room, and expense of annual Soirée.

"A comparison of the last three years shows the following results:—

Years.	Ordinary Receipts. £	Total Expenditure. £		£
1886	7968	7768	Surplus ..	200
1887	8008	8493	Excess ..	485
1888	8053	7909	Surplus ..	144

"The arrears of subscriptions, valued last year at 470*l.*, have decreased this year to 412*l.*

"The total Assets of the Society, valued last year at 40,078*l.* 7*s.* 0½*d.*, have increased to 40,164*l.* 13*s.* 6½*d.*, arising from the increase in the balance at the end of the year.

(Signed)

RAWSON W. RAWSON,	} Auditors.
HENRY BARKLY,	
J. D. THOMSON,	
E. O. TUDOR,	

"March 27th, 1889."

"The following Balance Sheet and Statement, showing the Receipts and Expenditure of the Society from the year 1848 up to the present date, are annexed to the Report of the Auditors:—

Receipts.		BALANCE SHEET FOR THE YEAR 1888.		Expenditure.	
1888.	£ s. d.	£ s. d.	1888.	£ s. d.	£ s. d.
Balance in Bankers' hands 31st Dec. 1887..	27 2 0		House:—		
Do. Accountant's do.	12 12 8½	39 14 8½	Taxes and Insurance..	106 5 2	
Subscriptions:—			Repairs and Furniture	110 17 2	
Arrears.. .. .	378 0 0	4906 0 0	Fuel, Gas, and Water	70 9 5	
For the current year..	3907 0 0	477 0 0	Miscellaneous	120 12 7	407 4 4
Paid in advance	620 0 0	477 0 0	Office:—		
Entrance Fees .. ..	.. ..	477 0 0	Salaries	984 12 0	
Life Compositions.. ..	.. ..	594 0 0	Stationery and Printing	247 15 9	
Payments made in error	.. ..	44 8 2	Miscellaneous	147 19 6½	1380 7 3½
Parliamentary Grant ..	.. ..	500 0 0	Library:—		
Royal Premium .. ..	.. ..	52 10 0	Salaries.. .. .	370 0 0	
Rent of Shop and Van..	.. ..	135 18 4	Purchase of Books ..	106 7 4	
Publications, sale of ..	312 19 8		Binding	97 6 0	
Advertisements in 'Proceedings'	152 0 0	464 19 5	Miscellaneous	60 8 11½	584 2 3½
Loan of Diagrams.. ..	.. ..	5 5 0	Map-Room:—		
Payments for Scientific Instruction .. .. .	.. ..	23 10 0	Salaries	450 0 0	
Dividends:			Purchase of Maps and Diagrams	101 15 6	
North-Eastern Railway 4 per Cent. Debenture Stock.. .. 1000l.	38 17 6		Instruments and Repairs	74 16 10	
Great Indian Peninsula Railway 5 per Cent. Stock .. 4000l.	251 10 9		Miscellaneous	126 2 8	762 15 0
Great Western Railway 4½ per Cent. Stock [Davis Bequest] 1800l.	74 6 11		Map-Drawing-room:—		
London and North-Western Railway 4 per Cent. Stock [Murchison Bequest] 1000l.	38 17 6		Salaries .. .. .	.. ..	250 0 0
Caledonian Railway 4 per Cent. Preference Stock .. 2000l.	77 15 6		Meetings:—		
Norwegian 4 per Cent. Bonds .. 1000l.	39 0 0		Evening Meetings ..	217 12 9	
New South Wales 3½ per Cent. Stock [Gill Memorial] 1028l. 5s. 6d.	35 0 4		Solrée at Willis's Rooms	106 8 6	
India Stock .. 1000l.	34 1 5		Miscellaneous	34 7 8	360 8 11
India 3 per Cent. Debentures .. 1000l.	34 1 2		Medals and other awards	.. ..	269 4 0
Consols 3669l. 2s. 2d.	133 16 0		Scientific Purposes:—		
" [Peck Fund] 1000l.	36 9 4½		Scientific Instruction..	51 0 0	
" [Back Bequest] 561l. 0s. 8d.	20 9 3½		Grant to Oxford University Extension ..	60 0 0	
" [Trevelyan Bequest] 510l. 4s. 0d.	18 12 2		Grant to Oxford University Readership..	160 0 0	
Payment of 5s. on conversion	14 7 0		Miscellaneous	10 0 0	271 0 0
Interest on 1000l. deposited to July 4th..	3 9 7	850 14 1	Publications:—		
			Printing Monthly 'Proceedings'	1067 12 11	
			Maps and Illustrations	836 19 6	
			Postage of 'Proceedings'	342 4 0	
			Payments to Contributors, Translations, &c.	204 0 0	
			Editor of Publications	200 0 0	
			Printing Vol. 2, Part 2, Supplementary Papers	240 4 6	
			Miscellaneous	59 2 6	2950 2 11
			Payments in error returned	.. ..	45 0 0
			Expeditions:—		
			Expenses on account of Mr. Last's African Expedition	388 13 9	
			Grant towards Mr. J. Thomson's Morocco Expedition	100 0 0	
			Grant towards Rev. W. S. Green's Selkirk Range Expedition ..	100 0 0	
			Grant towards Asia Minor Exploration Fund	50 0 0	638 13 9
			Balance in Bankers' hands 31st Dec. 1888 (less cheques not cashed)	172 5 0	
			Do. Accountant's do.	11 16 2½	184 1 2½
		£ 8092 19 8½			£ 8092 19 8½

REGINALD T. COCKS,
Treasurer.

Audited and found correct, 27th March, 1889.
RAWSON W. RAWSON,
HENRY BARKLY,
J. D. THOMSON,
E. O. TUDOR,

Auditors.

**STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year
1848 to the 31st Dec., 1888.**

	Year.	Cash Receipts within the Year.	Cash Amounts invested in Funds	Deducting Amounts invested in Funds; actual Expenditure.
		£ s. d.	£ s. d.	£ s. d.
¹ Includes Treasury Grant of 1000 <i>l.</i> for the East African Expedition.	1848	890 10 5	.. ..	756 6 1
	1849	778 8 0	.. ..	1,086 7 0
	1850	1,636 10 5	.. ..	677 2 10
² Includes Treasury Grant of 2500 <i>l.</i> for the East African Expedition.	1851	1,066 11 8	.. ..	906 14 7
	1852	1,220 3 4	.. ..	990 13 1
³ Includes Legacy of Mr. Benjamin Oliveira, 1866 <i>l.</i> 17 <i>s.</i> 1 <i>d.</i>	1853	1,917 3 5	.. ..	1,875 6 0
	1854	2,565 7 8	.. ..	2,197 19 3
	1855	2,564 7 0	.. ..	2,636 3 1
⁴ Includes Legacy of Mr. Alfred Davis, 1800 <i>l.</i>	1856	3,372 5 1	833 10 0	2,538 5 1
	1857	3,143 13 4	378 0 0	3,480 19 9
⁵ Includes Legacy of Sir Roderick Murchison, 1000 <i>l.</i>	1858	3,089 13 1	.. ..	2,944 13 0
	1859	3,471 11 5	950 0 0	3,423 3 0
⁶ Includes Mr. James Young's Grant for Congo Expedition, 2000 <i>l.</i>	1860	6,449 12 1	466 17 5	6,406 3 7
	1861	4,792 12 0	1,358 2 6	3,074 7 4
	1862	4,652 7 9	1,349 7 0	3,096 16 4
⁷ Includes 1000 <i>l.</i> 14 <i>s.</i> 6 <i>d.</i> sale of Ex- chequer Bills.	1863	8,266 9 3	1,837 10 0	3,665 4 0
	1864	4,977 5 5	1,795 5 0	2,647 7 10
⁸ Includes Mr. James Young's Grant for the Congo Expedition, 1041 <i>l.</i> 14 <i>s.</i>	1865	4,905 8 3	1,041 5 0	4,507 4 5
	1866	8,086 8 3	1,028 15 0	4,082 15 0
	1867	5,462 7 11	1,029 0 0	3,943 17 4
	1868	5,991 4 0	1,867 3 8	4,156 7 10
⁹ Includes Parliamentary Grant of 3000 <i>l.</i> to Cameron Expedition.	1869	6,889 16 0	2,131 5 0	4,846 0 0
	1870	6,012 6 1	3,802 0 0	3,645 10 0
¹⁰ Includes Donation of 500 <i>l.</i> by Mr. C. J. Lambert.	1871	6,637 3 7	1,600 0 0	3,726 4 4
	1872	8,119 7 9	1,599 6 5	6,871 13 2
	1873	7,761 18 10	2,015 0 0	6,697 12 6
¹¹ Includes Legacy of Admiral Sir George Back, 540 <i>l.</i>	1874	6,753 5 10	499 0 0	7,876 2 3
	1875	7,934 15 10	2,062 7 5	6,883 4 16
¹² Includes Legacy of Sir W. C. Tre- velyan, 500 <i>l.</i>	1876	11,611 11 8	.. ..	6,870 13 1
	1877	107,950 1 11	2,538 2 0	6,940 17 11 ^a
	1878	18,124 10 0	3,000 0 0	6,361 8 5
¹³ Includes 1000 <i>l.</i> 6 <i>s.</i> 2 <i>d.</i> , sale of Ex- chequer Bills.	1879	18,979 14 10	1,661 10 10	6,990 14 2
	1880	8,589 13 4	1,667 5 1	6,464 1 10 ^b
¹⁴ Includes 1000 <i>l.</i> received from Mr. B. Leigh Smith.	1881	8,309 10 5	.. ..	6,362 5 5 ^c
	1882	11,942 16 0	.. ..	6,779 10 7
	1883	10,599 9 0	1,001 5 0	6,624 2 31
¹⁵ Includes 500 <i>l.</i> on loan from Bankers.	1884	10,964 11 7 ^d	.. ..	6,266 0 5
	1885	10,738 12 3	.. ..	6,555 3 10 ^d
¹⁶ Includes 188 <i>l.</i> 6 <i>s.</i> 10 <i>d.</i> , sale of India Debentures.	1886	17,908 9 0	1,500 0 0	7,767 18 0 ^e
	1887	6,007 18 3	.. ..	6,493 10 3
¹⁷ Includes Donation of 1000 <i>l.</i> from Miss Gill.	1888	8,053 5 0	.. ..	7,908 18 6

^a This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February, 1877.

^b This amount includes the payment of two sums of 500*l.* each, contributed to the African Exploration Fund in this and the previous year.

^c This sum includes the payment of 102*l.* 8*s.* to the African Exploration Fund; also 71*l.* 9*s.* 1*d.*, the final payment for Cameron Expedition Fund.

STATEMENT OF ASSETS—31st December, 1888.

	£	s.	d.
Freehold House, Fittings, and Furniture, estimated (ex- clusive of Map Collections and Library insured for 10,000 <i>l.</i>) .. .. .	..	..	20,000 0 0
Investments (amounts of Stock), as detailed in the above Report of the Auditors .. .. .	..	..	19,568 12 4
Arrears due on December 31, 1888, £1031 0 0, Estimated at .. .. .	..	..	412 0 0
Balance at Bank (less Cheques not cashed)	£172	5	0
„ in Accountant's hands	11	16	2 ¹ / ₂
Total	£40,164	13	6 ¹ / ₂

Publications.—The monthly 'Proceedings' have been issued with regularity throughout the year; the twelve numbers for 1888 forming a volume of 848 pages, illustrated by 26 maps and 4 pictorial diagrams. The total cost of the edition of 5000 copies (including 342*l.* 4*s.* for free delivery to Fellows and Institutions) was 2246*l.* 16*s.* 5*d.* From this is to be deducted the amount of 464*l.* 19*s.* 5*d.* received from sale of copies to the public and from advertisements. One part of the 'Supplementary Papers (Vol. II., Part 2)' was also issued during the year; the total cost of which was 240*l.* 4*s.* 6*d.*

The Educational Collection.—This collection is now all arranged, and has been visited by a considerable number of teachers and others during the year. In connection with this, numerous letters have been received during the year asking for information as to the best appliances for use in teaching geography, as well as on other points which come under the head of geographical education.

Library.—During the past year 900 books and pamphlets have been added to the Library; 743 by donation, and 157 by purchase; 423 pamphlets have been put in covers by the Society's map-mounter, and 356 volumes have been bound. As will be seen by the above figures the donations for the year again greatly exceed the purchases.

The sum of 59*l.* 16*s.* 4*d.* has been spent in purchasing books, and the further sum of 97*l.* 18*s.* 6*d.* in binding for the Library.

Among the more important accessions are the following:—Gerard's 'Land Beyond the Forest,' 2 vols. (the Publishers); Carles' 'Life in Corea' (the Publishers); Sir D. Forsyth's 'Autobiography'; Binder, 'Au Kurdistan en Mésopotamie et Perse'; Bonnetain's 'L'Extrême Orient'; Lieut. Allen's 'Report of an Expedition to the Copper, Tananá, and Kóyukuk Rivers, Alaska' (Lieut. Allen); Suess, 'Das Antlitz der Erde,' II. Band; Sir R. Temple's 'Palestine Illustrated' (the Publishers); Yate's 'Northern Afghanistan' (the Publishers); Beaulieu's 'L'Algérie et la Tunisie'; Drummond's 'Tropical Africa' (the Publishers); Tissot's 'Géographie Comparée de la Province Romaine d'Afrique,' Tome II. and Atlas; Agassiz, 'Three Cruises of the *Blake*,' 2 vols. (the Publishers); Corbin's 'Life of Maury' (the Publishers); Baumgarten's 'Deutsch-Afrika'; Coquilhat, 'Sur le Haut-Congo'; Frey's 'Campagne dans le Haut Sénégal et dans le Haut Niger'; Prince Ibrahim-Hilmy's 'Literature of Egypt and the Soudan,' Vol. II.; Nordenskiöld's 'Seconde Expédition Suédoise au Grönland'; Russell's 'Genesis of Queensland'; continuation of the Reports on the Scientific Results of the Voyage of the *Challenger* (the Lords of the Treasury); the publications of the Meteorological Office, and of the Intelligence Department of the War Office; continuation of the General Report of the Survey of India (the Director-General of the Survey); Paget and Mason's 'Record of the Expeditions against the North-West Frontier Tribes,' and 3 District and Provincial Gazetteers of the Punjab (H.M. Secretary of State for India); continuation of the Records of the Geological Survey of India (the Indian Government); Daubrée, 'Les Eaux Souterraines,' 3 vols. (the Author); Hettner's 'Reisen in den Columbianischen Anden'; Neumayer's 'Anleitung zu Wissenschaftlichen Beobachtungen auf Reisen,' 2nd Edit., 2 vols. (Dr. Neumayer); McCormick's 'Voyages of Discovery in the Arctic and Antarctic Seas, and Round the World,' 2 vols.; 'Forschungen zur Deutschen Landes- und Volkskunde,' 2 vols.; Foucauld's 'Reconnaissance au Maroc, 1883-1884,' Text and Atlas; 'Oran et l'Algérie en 1887,' 2 vols. (Sir Lambert Playfair, K.C.M.G.); Thys, 'Au Congo et au Kassai' (the Author); Hinman's 'Eclectic Physical Geography' (the Publishers); Jukes-Browne, 'The Building of the British Isles' (the Publishers); Hurgonje's 'Mekka,' 2 vols., and Atlas (H.E. the Minister for the Netherlands); Prjevalsky's 'Fourth Expedition into Central Asia'; Justin

Winsor's 'History of America,' Vol. VII., Part II.; Annual Report of the Geological and Natural History Survey of Canada (the Director of the Survey); continuation of the Reports of the Tenth Census of the United States, 1880 (United States Government); the Publications of the U.S. Geological Survey; Latzina's 'Geografía de la República Argentina' (the Author); Margry's 'Mémoires et Documents pour servir à l'Histoire des Origines Françaises des Pays d'Outre-Mer,' Tome VI.; various Publications of the Dépôt des Cartes et Plans de la Marine, the Chinese Imperial Maritime Customs, and of the Victorian and Queensland Governments; continuation and completion of the 'Encyclopædia Britannica,' 9th Edn. (the Publishers); the Publications of the Prussian Geodetic Institute; Favenc's 'History of Australian Exploration' (Sir Saul Samuel, K.C.M.G.); Ainsworth's 'Personal Narrative of the Euphrates Expedition,' 2 vols. (the Publishers); Report of the Krakatoa Committee of the Royal Society on the Eruption of Krakatoa (the Council of the Royal Society); Wardrop's 'Kingdom of Georgia' (the Publishers); Lund's 'Como'; Russell's 'Souvenirs d'un Montagnard (1858-1888)' (the Author); Mrs. Walker's 'Untrudened Paths in Roumania' (the Publishers); Sir John Strachey's 'India' (the Publishers); Hawkins' 'Plymouth Armada Heroes'; De Lériss' 'L'Italie du Nord'; Bonvalot's 'Du Caucase aux Indes à travers le Pamir,' and English Edition, 2 vols.; Finsch's 'Samoafahrten,' and Atlas; Abercromby's 'Seas and Skies in Many Latitudes' (the Publisher); Andrieux's 'Géographie des Welthandels,' 3 vols. in 4; Asbóth's 'Bosnien und Herzegovina'; Rein's 'Industries of Japan'; Staudinger, 'Im Herzen der Haussaländer'; Gisborne's 'New Zealand' (the Author); Benko's 'Reise S.M. Schiffes *Albatross* . . . nach Süd Amerika, &c.' (the Publishers); Lady Brassey's 'Last Voyage to India and Australia in the *Sunbeam*' (the Publishers); Götz, 'Die Verkehrswege im Dienste des Welthandels'; Arnot's 'Garenganze' (the Author); Lady Macgregor's 'Life and Opinions of Major-Gen. Sir C. M. Macgregor, K.C.B., &c.,' 2 vols. (the Publishers); and Moss, 'Shores of the Polar Sea' (C. R. Markham, Esq.).

Scientific Purposes Grant.—During the past year 21 intending travellers have received instruction from Mr. Coles in Practical Astronomy in the Society's Observatory, and in route surveying with the theodolite and plane-table, in the country. The total number of hours devoted to teaching during the year was 174.

Instruments to the value of 355*l.* 10*s.* 6*d.* have been lent during the past year to the following travellers:—Mons. H. M. P. de la Martinière (Marocco), 40*l.*; Lieut. H. G. C. Swayne (East Africa), 147*l.* 10*s.* 6*d.*; Mr. F. C. Selous (South Central Africa), 4*l.* 10*s.*; Mr. A. P. Maudslay (Guatemala), 45*l.* 10*s.*; Mr. H. H. Johnston (Mozambique), 23*l.* 8*s.*; Mr. F. S. Arnot (Central Africa), 63*l.* 18*s.* 6*d.*; Rev. A. Hetherwick (South-East Africa), 30*l.* 13*s.* 6*d.*

The instruments lent to the following gentlemen have been returned, with the exception of those which have been lost: Dr. W. K. Poden (East Africa), 1880; Mr. H. H. Johnston (West Africa), 1885; Mr. H. W. Seton-Karr (Mount St. Elias Region, N. W. America), 1886; Mr. Joseph Thomson (Marocco), 1888; Rev. W. Spotswood Green (British Columbia), 1888; Mr. Theodore Bevan (New Guinea), 1887; Mr. C. M. Woodford (Solomon Islands), 1888.

The following is a list of travellers who still have instruments lent them in their possession:—Rev. W. P. Johnston (East Africa), 1879; Rev. W. G. Lawes (New Guinea), 1880; Rev. T. Wakefield (East Africa), 1882-83; Mr. W. Deans Cowan (Madagascar), 1883; Mr. E. Douglas Archibald (for cloud observations in England), 1885; Dr. E. J. Baxter (East Africa), 1884-85; Lieut.-Col. Kitchener, R.E. (East Africa), 1885; Mons. H. M. P. de la Martinière (Marocco), 1887-89; Lieut. H. G. C. Swayne (East Africa), 1888; Mr. F. C. Selous (South Central Africa), 1888; Mr. A. P. Maudslay (Guatemala), 1888; Mr. H. H. Johnston (Mozambique), 1889;

Mr. F. S. Arnot (Central Africa), 1889; Rev. A. Hetherwick (South-East Africa), 1889.

Map Room.—The accessions to the Map Room Collection during the past year comprise 1775 Maps and Charts on 1962 sheets; 20 Atlases, containing 357 sheets of Maps, 486 Photographs, and 223 Magic Lantern Slides. Of these, 60 Maps on 182 sheets, 17 Atlases, 71 Photographs, and 180 Magic Lantern Slides have been purchased.

Among the most important donations to the Map Room Collection are 1187 sheets of the Ordnance Survey of the British Isles (presented by the First Commissioner of Public Works, through the Director-General of the Ordnance Survey); 63 British Admiralty Charts (The Lords Commissioners of the Admiralty, through the Hydrographer); 102 sheets of the various Indian Government Surveys (H.M. Secretary of State for India); 30 French Charts (Service Hydrographique de la Marine, Paris); 19 United States Charts (Lieutenant G. L. Dyer, U.S.N., Hydrographer to the Bureau of Navigation, Washington, D.C.); 22 Danish Charts (The Hydrographer, Danish Admiralty); 13 Maps published in Petermann's 'Geographische Mittheilungen' (Herr Justus Perthes); 'Charts showing the Mean Barometrical Pressure over the Atlantic, Indian, and Pacific Oceans,' and Part IV. of the 'Synchronous Weather Charts of the North Atlantic and adjacent Continents for every day from 1st August, 1882, to 3rd September, 1883' (Meteorological Office); 9 Maps of various parts of Africa (Intelligence Division, War Office); Map of the Police Districts, Cape Colony, 1887 (Agent-General for the Cape of Good Hope); Mapa de la República Argentina y de los Países contiguos, compilado por J. Duclout, publicado por Ernst Nolte, Buenos Aires (The Publisher); Atlas de la República Argentina (l'Institut Géographique Argentin); Dr. H. Kiepert's Wall Maps of Ancient Latium, Ancient Asia Minor, and Ancient Gaul (Herr D. Reimer); Map of the Territory and Dependencies of Johore (His Highness the Sultan of Johore); Atlas Universal para las Escuelas primarias, secundarias y normales. Edición grande con 38 Mapas, para el Reino de España (Herr F. Volkmar); Isla de Luzon y sus adyacentes por D. Enrique d'Almonte y Muriel, 1883 (Spanish Minister for the Colonies); 3 sheets of the Generalstabens topographiske Kaart over Danmark (Danish Minister of War, through the Danish Legation); Carte de Madagascar, dressée par le Père D. Roblet, S.J. (Messrs. H. Lecene et H. Oudin, Paris); Movable (Tropic) Diagram of the Seasons (J. W. Mason, Esq.); 13 Maps of various parts of the World and 1 Atlas of Canada (Sir J. W. Redhouse, K.C.M.G., K.N.); Nuovo Atlante Geografico (Messrs. G. B. Paravia and Co.); Atlas to accompany a Monograph on the Geology and Mining Industry of Leadville, Colorado, by Samuel Franklin Emmons (Department of the Interior, Washington); Sketch Survey by Rev. George Grenfell from Stanley Pool on the Congo, to Kingunji Falls on the Kwango River, MS. (Rev. George Grenfell); XXXIII. Lieferung of the Topographischer Atlas der Schweiz (Swiss Government, through the Foreign Office); MS. Tracing of Map of the Ngala River, surveyed by J. R. Werner (The Author); 5 Maps of various parts of New Zealand (6 copies of each) (Agent-General for New Zealand); Kaart van Guiana, by W. L. Loth, published by J. H. de Bussv, Amsterdam (the Publisher); 48 Photographs of Mountain Scenery in Colorado (F. H. Chapin, Esq.); 76 Photographs of New Guinea, &c. (Staff-Surgeon H. E. F. Cross, R.N.); 91 Photographs of Natives and Scenery of the Solomon Islands (C. M. Woodford, Esq.); 44 Photographs of Scenery in the South of France (James Jackson, Esq.); 58 Photographs of S.E. Alaska (Lieut.-Commander C. M. Thomas, U.S.N.); Autotype enlargements of Koshtantau and Djanga (Caucasus) (Hermann Woolley, Esq.); 34 Photographs of Morocco (Mons. H. M. P. Martinière).

Six new diagrams have been constructed by the Society's draughtsman, and

three have been drawn off the premises. Important alterations have been made to 10 others.

The adoption of the Report was moved by the Right Hon. Sir GEORGE BOWEN, seconded by Mr. R. N. CUST, and agreed to by the Meeting.

PRESENTATION OF THE ROYAL MEDALS.

The Royal Medals for the Encouragement of Geographical Science and Discovery had been awarded by the Council this year as follows :

The Founder's Medal to Mr. A. D. CAREY (Indian Civil Service); for his remarkable journey in Central Asia, at his own risk and expense, during which he travelled over a distance of about 4750 miles, through regions which have never before been visited by an Englishman, and very rarely by any European. The route he followed led from Leh, by Rudokh to Kiria and Khoten, thence across the desert to Kuchar, and south-eastward to Lob Nor, whence he traversed the Altyn Tag and Kuen Lun ranges, and travelling eastward struck the pilgrim-route from Koko Nor to Lhasa, returning to Western Tibet by a new route through Hajjar, Sachu, and Hami. Also for the *résumé* of his travels and map contributed by him to the 'Proceedings' of the Society, by which he has rendered a most valuable service to Geography.

The Patron's Medal to Dr. G. RADDE (Director of the Natural History Museum, Tiflis); for a life devoted to the promotion of Scientific Geography, as a traveller, observer, and author, and particularly for his five years' travels in Eastern Siberia (1855-60), his persistent exploration of the Caucasian chain (1864-5 and 1876-85), Mingrelia, Abkhasia, Karatchai, Daghestan, and of the Armenian Highlands, and the Caspian coast (1875-80), and his services as chief of the Transcasian Expedition in 1886. Also for the important works in which he has recorded the result of his explorations: (1) 'Reisen in Ost-Sibirien, mit Karten,' 1862-4; (2) 'Die drei langen Hochthälern Imeritiens'; (3) 'Vier Vorträge über den Kaukasus,' 1874; (4) 'Aus den Hochalpen des Daghestan,' 1886; (5) 'Die Chewsuren und ihr Land,' 1878; (6) 'Reisen um die Persisch-Russischen Gränzen,' 1885; (7) 'Vorläufiger Bericht über die Expedition nach Manchurien und Khorassan,' 1887. And particularly for the talent with which, while paying special attention to various branches of natural history, especially ethnology, ornithology, and botany, he has kept in view their relations to Geography, and has made it his main object to set out in a clear and comprehensive manner the physical characteristics of the countries he has explored, with their causes and effects (see Nos. 1, 3, and 5). And finally, for the zeal, energy, and artistic intelligence he has exhibited in the arrangement on a Geographical basis of the Natural History Museum at Tiflis.

Mr. A. E. CAREY, C.E., attended to receive the medal on behalf of his brother, now in India. Addressing him the PRESIDENT spoke as follows:—

Mr. CAREY, I have much pleasure in handing to you this Medal to be forwarded to your brother whose absence to-day we much regret. It is no small gratification to myself to be entrusted with this duty, having been as you know connected throughout my life with the public service of India, in which Mr. Carey holds a distinguished position, and because it was in Tibet, to the exploration of a hitherto unknown portion of which he applied himself, that my own most important lessons in geography were received some forty years ago. I am one of the few persons likely to be here present, who has had the opportunity of gazing on the vast mass of mountains that Tibet presents to the traveller, with its singular combination of wide plains and narrow valleys, or who has crossed the lofty passes leading over glaciers and fields of perpetual snow to its barren and almost uninhabited interior, and has thus had some experience of the labours and difficulties attending such journeys. With this knowledge, no one can more fully appreciate than I do the high credit due

to Mr. Carey for his most successful conduct of the extremely arduous and prolonged expedition which led him over so large a part of the heart of Asia, and has enabled him to secure such valuable geographical information of regions hitherto wholly unvisited. He will, I feel certain, have felt most deeply the unfortunate fate of his associate Mr. Dalgleish, to whose memory a special tribute is due, it having been to him that we are mainly indebted for the accurate record of the geographical details of these remarkable journeys.

Mr. A. E. CAREY, in reply, expressed his great appreciation of the high honour conferred upon his brother by the Council of the Society. The President had referred in eloquent terms to the geographical features of his journey, and the Society would be glad to know that his health was entirely unimpaired. The paper communicated by him to the Society did not give an adequate idea of the difficulties which had to be encountered by his party in the passage of the frontier mountains on leaving and returning to India. It must be borne in mind that the whole success of the expedition depended on striking the Tibetan frontier at some point not in common use as a trade track. On Sept. 15th, 1885, he wrote from Polu as follows:—"The date above will not tell you much, but I have no little satisfaction in writing it. Polu is in Turkestan, and to get here I have made a march of a month through a district without houses or inhabitants, or any trace of the existence of man, without path or track of any kind. We had to guide ourselves by the compass, like navigators at sea. The road lay across a high Tibetan plateau. For nineteen days we were never once lower than 16,000 feet, and often 2000 feet higher. This altitude made it trying for the men and baggage animals, and indeed for every one, as the slightest exertion made breathing difficult. Unfortunately the weather was bad. During sixteen days we had snow, sleet, and intense cold, so that everything got wet in the day and froze hard at night. Towards the last we were hard up for fuel, and had to burn some of the wooden pony saddles to make tea and soak our biscuit in—the only cooking we could manage." Another letter had probably had an unique experience. It was written at Lob-nor on April 23rd, 1886, and its route was thus described:—"This letter will have to pass through many hands, and the chances are it may fail to reach you. A man is about to start on official business to Kuchar, who undertakes to give this to a Pathan trader there who has dealings in far Yarkand. He, I hope, will manage to send it on to the Kashmiri Aksakal there, who in his turn may perhaps find an opportunity of forwarding it by one of the season's caravans to Leh, where there is a post office. It is not such a simple thing as you may imagine, to send a letter even a single thousand miles, where there is no post office." The letter reached London in five months. Since the death of General Prejevalsky and the murder of Mr. Dalgleish, Mr. A. D. Carey remained the only living European who had visited a great portion of the district traversed in his expedition. It was not too much to say that the murderers of Mr. Andrew Dalgleish struck down the best friend of the wild people among whom he had made his home. So long as he was living amongst them, they had on their side a representative Englishman of the highest type, a man of courage and resource, of uprightness and humanity. The Chinese authorities had so high an opinion of his discretion, that in 1883 they granted him a free passport to enter Chinese Turkestan whenever he pleased. It was sometimes said of such journeys, "*Cui bono?*" The President had shown how such a journey widened the bounds of geographical knowledge, but beyond that it afforded one more proof that the old exploring spirit of Englishmen was still a potent factor in the orderly progress of the world.

Next addressing Dr. RADDE, the President said, It is, as you are well aware, among the traditions of the Royal Geographical Society, that the Council in making the awards of the Medals at its disposal, should endeavour to recognise high merit in

geographical research and discovery wherever it is best found. Though we may therefore first look around the ranks of our own countrymen for suitable candidates for such distinctions, we bear in mind that we are all subjects of that larger kingdom of Science of which you have shown yourself to be so zealous a servant; and in testimony of our high estimate of your long continued and valuable labours in the cause of Scientific Geography, the Council has awarded you the Patron's Medal, which I have great pleasure in handing to you.

May the rivalry between the great nation whose subject you are, and our own, be long such as that in which we to-day recognise your success, and be applied to the promotion of knowledge in its highest form and the arts of peace, a contest in which there are neither victors nor vanquished, and in which all engaged are alike rewarded.

Dr. RADDE replied in words of which the following is a translation:—

The rare honour which the Council of the Royal Geographical Society has conferred upon me in awarding me your Royal Medal, accounts for my presence here to-day. This is to me a red-letter day; it crowns with the most precious honour what little work I have been able to accomplish during my forty years' travels.

Born in North Germany, in narrow but honourable condition, I began the struggle for existence after the death of my parents. Inspired then as now with a love for nature, her eternal laws and inexhaustible beauties, and under the loving guidance of my ever-to-be-remembered teacher, Professor Anton Menge, I mastered that fundamental knowledge absolutely essential to the investigation of nature, and then, with irresistible force, I was impelled forward, ever forward.

I turned my eyes to the East. Russia, especially the Tauric Peninsula, received me with open arms. It rejoices my soul, even now, to revel in the memories of those delightful days. In the old Chersonesus, by Cape Parthenion, I heard in my soul the voice of Iphigenia, and the waves of the Pontus sang their song in my ears. Then came the war; and I tended your wounded countrymen, the soldiers of the Alma.

In the year 1855 came the decisive step of my future career. The Imperial Russian Geographical Society appointed me a member of the expedition to East Siberia. After wandering round Lake Baikal, the scenery of which gave me an impression of the deepest melancholy, there followed the journey to Dauria, on the north border of the high Gobi. In 1856 I found myself in the same region wherein the great Pallas, in the time of the Empress Catherine, completed the last stage of his work. Then came two years of a kind of Robinson Crusoe life in the primeval forests of the Middle Amur, which ended with the founding of a Cossack colony that bears my name. Finally, in 1859, came the ascent of the Munku-Sardyk and the region that gives origin to the eastern feeders of the Yenissei. Returning in 1860 with rich collections, I was able to work out my material in the bosom of the Imperial Academy. The recognition of this work on the part of the Academy and of the Universities of Dorpat and Breslau, was all the more valuable that it spared me the troublesome task of further examinations.

Since 1864, when I was entrusted by his Imperial Highness the Grand Duke Michael Nikolajewich, Governor of the Caucasus territory with biologico-geographical research in that richly endowed region, I have continued to work up till now, according to opportunity, and as far as the limited power of a single individual will permit. I carried out a long series of expeditions of more or less magnitude and importance. They embrace the region of Upper Armenia from Erzerum on the west, to the Iranian Sawalan on the east. They included, moreover, with the exception of the Ossetian Alps and the mountains west from Elbruz, the entire

main ridge of the isthmus and the slopes and plains on both sides. I several times visited the Russian Talysh region and the Gilan plain. The expedition of 1886 sent to the Transcaspien, by order of the Emperor, enabled me to become especially acquainted with the Aralo-Caspian depression, the Kopet-Dagh Chain, the Tejen, and Murghab, the Afghan border, and Northern Khorassan. As a safe resting place for the collections made during my expeditions and the contributions received from other quarters, I was able in 1866 to lay the foundation of the Caucasian Museum. From small beginnings and with a meagre endowment, it has now developed into a great local institution. In spite of many obstacles and petty jealousies, by enthusiasm, energy, and courage, it has been gradually developed into its present important dimensions.

Gentlemen, what I have hitherto accomplished in the way of writing, either in the field of geography or in its sister sciences, has come under your rigid criticism, and, in spite of many failings, you have found it worthy of recognition. The honour which I now receive I may take as the full expression of your opinion, and for me such an expression is the highest and most precious reward. Now, when my hair is turning grey, and my body reminds me of the infirmities of approaching age—now, when I may not, without any thought of myself, revel over the steppes; no longer with my old sureness of foot tread the chaos of rocks high above the edge of the glacier, or the steep crater precipices of extinct volcanoes—I must gradually resign myself to retirement.

But I have by my lifework become a rich man—not in the world's goods, but in spirit. Heart and soul have remained young; my memory is still clear, my imagination a living gallery of pictures. In moments of excitement I revel in memories of the past—the solitudes of the majestic Caucasus; the eerie stillness of the Siberian pine forests; the angry waves of the foamy sea; my camps in the shade of the lordly trees of ancient Colchis. They are endless; picture follows picture. And the life in the midst of these scenes is rich, is exuberant. Amid the bustle of great cities have I have often told the story of my wanderings to earth's greatest magnates, have slept in luxurious chambers, been dazzled with gold and gems, and oppressed with superfluities. Again, I have lain on the hard ground with a saddle for my pillow, in a little yurt, while a Shaman said his prayers before a blazing fire, and a poor Tungus woman breathed her last.

This wealth of memories remains to me, I cannot be despoiled of it. But in itself it is of little value. This sort of capital, too, requires to be insured. There is, however, but one agency that can do this, and does it of its own accord and without recompense. If the varied experiences of life are to remain precious, they must be received in a grateful heart.

Gentlemen, it is such a grateful heart I have to offer to you here to-day. To do so is not only my obligation and duty, it is also a high and honourable privilege. For, whatever a man may be able to offer from his intellect to his fellows, yet it is his moral feelings—that at least is my belief—which must direct his intellect. And so, gentlemen, in this memorable moment, I once more thank you from the depth of my heart and the fulness of my soul.

THE MURCHISON AND OTHER AWARDS.

The PRESIDENT announced that the Council had awarded the above grants as follows:—

The MURCHISON GRANT for 1889, to Mr. F. S. ARNOT, towards providing and conveying a suitable present to the chief Chitambo, of Ilala, as a recompense for his services in connection with the removal of the body and personal property of Dr. Livingstone, in 1872.

The BACK PREMIUM for 1889, to Mr. F. C. SELOUS, in acknowledgment of the geographical work accomplished by him in his recent journey in Mashuna Land, and north of the Zambesi.

The CUTHBERT PEEK GRANT, to Mr. F. S. ARNOT, in recognition of the interest and value of his seven years' travels in Central Africa.

The GILL MEMORIAL, to Mr. M. J. OGLE (Indian Survey Department), in recognition of his excellent survey work in Eastern Assam, in Manipur, and in Northern and Western Burma, partly with Colonel Woodthorpe, and partly independently.

PRESENTATION OF THE TRAINING COLLEGE PRIZES.

The Scholarships and Prizes offered by the Society to the students of Training Colleges, for Geographical Proficiency in the Examinations of December 1888, had been awarded by the Examiners of the Education Department to the following:—

MALE STUDENTS. *Scholarship*: Alexander Gow, Borough Road College. *Prizes*: Thomas H. Coad, Fred Barraclough, and Amos A. Brayley, all of Borough Road College; Thomas Goodall, York College, and William Halliwell, Chester College (the last four equal).—FEMALE STUDENTS. *Scholarship*: Emily Mahon, Chichester College. *Prizes*: Frances Calver, Lincoln College, Elizabeth Mann, Stockwell College, Jessie W. Gibb, Edge Hill College, Helen Woolcott, Darlington College, Rose Martell, Salisbury College (the last three equal).*

Mr. H. J. MACKINDER, M.A. (Reader in Geography at Oxford), introduced to the President the successful competitors or their representatives. Previous to doing so he drew attention to the fact that the first four Prizemen were all from the same College, Borough Road, a remarkable result, due, as he had been informed, to Mr. Barkby, the teacher of Geography at that College. He was sure they would all agree that a word of praise was due from the Society to this gentleman for his successful method of teaching.

Mr. A. BOURNE, as connected with Borough Road College, Stockwell College, and Darlington College, thanked the Society for the encouragement they had given by the institution of these Prizes to the teaching of Geography in the Training Colleges of Great Britain.

THE LECTURESHIP OF GEOGRAPHY AT THE UNIVERSITY OF CAMBRIDGE.

The PRESIDENT announced that a vacancy having occurred in the Lectureship in Geography at Cambridge, owing to the retirement through ill-health of Dr. Guillemard, Mr. J. Y. Buchanan had been elected to fill it, and would, it was hoped, next term commence his inaugural series of lectures. He had great pleasure in informing the meeting that the instruction given at Oxford by the Lecturer, Mr. Mackinder, was extremely well appreciated by the students.

The Ballot was then opened.

* The MEDALS for the Promotion of Geographical Education, placed by the Society at the disposal of the Syndicates respectively of the Oxford and Cambridge Local Examinations, were awarded as follows:—

1888. Oxford (June).—*Silver Medal*—W. H. Crump, South Crosby. *Bronze Medal*—S. J. Cole, Portsmouth.

Cambridge (December).—*Silver Medal*—(Physical Geography)—Barbara Lucy Templeton, Exeter. *Silver Medal*—(Political Geography)—George Ernest Davis, Maidenhead.

The PRIZE ATLASES offered by the Society for Geographical Proficiency to the cadets of the Nautical Training Colleges on board H.M. ships *Worcester* and *Conway*, were awarded, at the examinations held in July 1888, to the following: Henry Eilbeck Hillman (*Worcester* training ship); Percy John Pape (*Conway* training ship).

THE ANNUAL ADDRESS.

The PRESIDENT read his Annual Address. (*Ante*, p. 405.)

The Scrutineers announced that the result of the Ballot was that the following list proposed by the Council was adopted (the names printed in *italics* being new Members, or those who change office):—

President: Right Hon. Sir Mountstuart E. Grant Duff, G.C.S.I., C.L.E., &c. *Vice-Presidents*: Sir Rutherford Alcock, K.C.B.; Francis Galton, Esq., F.R.S.; *Major-General* Sir F. J. Goldsmid, K.C.S.I., C.B.; Sir Joseph Hooker, K.C.S.I., C.B., F.R.S.; *General* R. Strachey, R.E., C.S.I., F.R.S.; *General* Sir C. P. Beauchamp Walker, K.C.B. *Treasurer*: Reginald T. Cocks, Esq. *Trustees*: Right Hon. Lord Aberdare, G.C.B., F.R.S.; Sir John Lubbock, Bart., F.R.S. *Secretaries*: Douglas W. Freshfield, Esq.; Col. Sir Francis W. de Winton, R.A., K.C.M.G. *Foreign Secretary*: Lord Arthur Russell. *Members of Council*: J. Ball, Esq., F.R.S.; *Right Hon.* Sir George F. Bowen, G.C.M.G.; Admiral Lindesay Brine; Hon. G. C. Brodrick; *R. N. Cust*, Esq., LL.D.; *Sir Alfred Dent*, K.C.M.G.; Col. J. A. Grant, C.B., F.R.S.; Sir John Kirk, G.C.M.G., F.R.S.; Lieut.-General Sir Peter S. Lumsden, G.C.B.; *General* R. Macdagan, R.E.; Clements R. Markham, Esq., C.B., F.R.S.; Alfred P. Maudslay, Esq.; Admiral Sir F. L. M'Cintock, F.R.S., *Major-General* Sir Henry C. Rawlinson, K.C.B., F.R.S.; Sir Rawson W. Rawson, K.C.M.G., C.B.; *P. L. Sclater*, Esq., F.R.S.; H. Seebohm, Esq., F.L.S.; *S. W. Silver*, Esq.; B. Leigh Smith, Esq., M.A.; Capt. W. J. L. Wharton, R.N., F.R.S.; Colonel Sir Charles W. Wilson, R.E., K.C.M.G., F.R.S.

Sir HENRY BARKLY proposed a hearty vote of thanks to the President for his very clear and interesting address. They would all join in regretting that it was the last which they were likely to hear from him from the chair, but that only made it the more necessary that they should express in an emphatic manner, their appreciation of the services he had rendered to geographical research during the period he had held office.

Mr. FRANCIS GALTON seconded the motion. Most Presidents, he said, had confined themselves to one address annually, but General Strachey had given two addresses besides four most scholarly papers on Geography. He was sure the Council would miss his ripe judgment and administrative capacity.

The resolution was agreed to.

The PRESIDENT thanked the meeting for the vote that had just been passed. He should always remember with great satisfaction the time during which he had occupied the chair. His duties had been made very easy by the assistance he had received from his fellow-workers in the Council, and in the office of the Society.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris, April 26th, 1889: M. FERDINAND DE LESSEPS, President of the Society, in the Chair.—This was the first general meeting of the year, and the occasion of the annual distribution of the Society's awards. M. W. Huber, the general secretary of the Commission on the Prizes, having read his report, the Chairman proceeded to distribute the medals. We have already announced* the names of those to whom the medals for the year were awarded.—Dr. L. Vincent then read a paper on Canada.

* *Ante*, p. 249.

— May 10th, 1889: M. MILNE-EDWARDS, of the Institute, in the Chair.—The Chairman opened the meeting by intimating that the late M. V.-A. Malte-Brun, whose death had been previously announced, had bequeathed to the Society the sum of 400*l.* for the purpose of founding a gold medal, to be called the "Conrad Malte-Brun Prize" in memory of his father; such medal to be awarded as the Central Commission might direct. M. V.-A. Malte-Brun, who was Honorary General Secretary of the Society and late President of the Central Commission, had rendered great service to geography by his writings.—Dr. Hamy communicated some news of M. Chaffanjon, who started from France some months ago with the intention of exploring the vicinity of the lagoon of Maracaibo, then ascending the high table-lands and descending again to the river Magdalena, the sources of which he would study. As yellow fever was raging on the borders of the lagoon, the traveller decided to traverse the Cordillera first of all, and, according to the latest information, had set out in the direction of the lakes, where he expected to arrive at the commencement of May.—M. T. de Quarenghi, in a somewhat lengthy paper, invited the consideration of the Society to several propositions with respect to the Universal Hour and the Initial Meridian; for the latter he suggested that of Jerusalem as being supported by eminent scientific, practical, and historical considerations.—In conclusion M. E. Blanc read a paper upon the best routes from Northern Africa to the Sudan. The author dealt first of all with the great natural routes which give access to the Sudan and pointed out that in this respect Tripoli and Morocco are the most favoured countries, while Algeria and Tunis are the worst off, the latter not possessing a single route into the Sudan. The three chief caravan centres are (1) Timbuktu and the upper or middle basin of the Niger; (2) Central Sudan, i. e. the countries lying round Lake Chad or which extend between this lake and the lower Niger; (3) Eastern Sudan. The first of these regions is now reached and served by the French possessions on the Senegal and the English stations on the lower Niger. In view of the advantages possessed by water-transit over communications by land, it may be said that the future of the trade of Western Sudan lies in the hands of these two establishments, and that the route connecting Algeria with Timbuktu, though possibly of political importance, will never be other than an accessory route for commerce. Eastern Sudan is reached by means of the valley of the Nile and the routes from the Red Sea, but these means of communication are for the present closed. Central Sudan, however, is undoubtedly the richest part of the whole. M. Blanc sketched briefly the railway line proposed by M. Rolland for tapping this region, which would pass close to the plateau of Abaggar, round which, on the west, lie the routes from Insalah, and on the east the great route from Rhat, and pointed out the present importance of Tripoli as the starting-point of the Trans-Saharan routes, and the great market of the Sudan. The best point from which to commence a line of railway from the French possessions in the North of Africa into the centre of the Sudan tapping the Tripoli routes, would be Bu-Grara in the south of Tunis. The line would run from Bu-Grara to Rhadames, and would possess many advantages over M. Rolland's Algerian scheme.

— May 24th, 1889: M. MILNE-EDWARDS, of the Institute, in the Chair. —After the correspondence had been read, M. H. Coudreau gave an account of his recent explorations in Guiana.*—The Chairman announced that the Central Commission had elected the following gentlemen as foreign correspondents of the Society. —General Greely, Chief of the Signal Service of the United States; M. Maurice de Déchy, of the Hungarian Geographical Society; and M. Amat de San-Philippo.

* See *ante*, p. 439.

Geographical Society of Berlin.—June 1st, 1889: Baron VON RICHTHOFEN in the Chair.—The Chairman announced that the Council of the Society had decided to award the Karl Ritter medal to Dr. Nansen. They had also decided to abstain from any official participation in the International Geographical Congress at Paris.—Dr. F. Boas read a report upon his explorations in British Columbia, which were principally devoted to ethnographical objects. The trade of the plateau region, situated with its numerous lakes to the east of the coast range, with the coast country, is confined to four routes only. In the south the Fraser river forms an old commercial artery. Farther north the gloomy ravine of Bute Inlet furnishes a line of communication, but is full of dangers. A brisker trade with the Upper Fraser river is carried on along the valley of the Bellaçoola river. Finally the Skeena river affords a fourth means of access into the interior. The southern part of the latter, comprising the highland between the Selkirk Mountains and the coast range, belongs to those regions of the high plains of North America which are deficient in rainfall. The rivers flow in deeply eroded beds. Agriculture is only rendered possible with the assistance of artificial irrigation. Nevertheless, cattle-rearing is extensively carried on. The higher regions are covered with forests, which grow more extensive further north with the increasing rainfall. The climate of these highlands is continental throughout. Settlement is confined to the gold-producing mountains on the eastern frontier and to the southern portion of the high plains. The composition of the soil and the climate of the coast are very different. The country is rocky, and so steep everywhere that there is but little soil capable of being cultivated. The comparatively cool moist climate produces impenetrable primeval forests, consisting of Douglas firs and Alaska cedars. The south part of Vancouver Island and the delta of the Fraser river are suitable for the cultivation of barley, oats, and hops, but the summer in the regions immediately bordering on the ocean is too cool and wet for the cultivation of grain. In the more northerly parts of the province the cool wet summer does not even permit of the cultivation of potatoes. The more thickly populated districts consequently lie exclusively round the shores of the Gulf of Georgia. There are only four towns in the country. New Westminster, in the delta of the Fraser river, is the centre of the agricultural industry of the mainland, and also of the great salmon fisheries in the Fraser river. The capital (Victoria) owes its rapid progress to the discovery of gold in British Columbia, and is the seat of the commerce with the United States. From here the traders in the north of the country draw their supplies. Connected with Victoria by means of a railway is the mining town of Nanaimo, the extensive coal deposits of which make it the most important coaling station on the North Pacific seaboard. The town of Vancouver, lying to the north of the mouth of the Fraser river, which has come into existence only since the completion of the Canadian Pacific Railway, controls the transit trade through British Columbia. The more northerly section of the coast is almost entirely destitute of settlers. Here and there the camps of woodcutters and small sawmills may be found. At the numerous river mouths there are salmon fisheries and manufactories for tinning the salmon. In the future the extensions of the coal-fields on the east coast of Vancouver Island, especially near Comox and on the Queen Charlotte Islands, promise to become of importance. Although the fishing industry is almost exclusively confined to salmon fishery, the sea is exceedingly rich in excellent fish, and more recent investigations have shown that the North Pacific fishing grounds surpass those of Newfoundland in productiveness. The total number of the Indians of British Columbia is estimated at 38,000. The tribes are polyglot in character. Chinook forms a mixed speech, the "lingua franca" of commerce, especially in Victoria, where Indians muster in large numbers as dock labourers, artisans, and vendors of fish, and the

women as washerwomen. For the traveller who desires to obtain further knowledge of the Indians, and to study them closer, Victoria is not a suitable place; he must seek out the natives in their homes. The most northern part of the coast is possessed by the Kingit-tinne, whom Krause described so fully. Next to these come the Haida, who inhabit the Queen Charlotte Islands. At the mouth of the Skeena and Nass rivers dwell the Tsimshian, who occupy the islands lying along the coast up to Millbank Sound. South of these come the Kwakiutl, extending as far as the Gulf of Georgia; their language falls into three groups, differing widely from each other. On the west coast of Vancouver the Nutka live. The extreme south of the coast is inhabited by tribes of Selish origin, who with respect to dialects, are very much divided. The languages of these various tribes extend over the coast range of mountains, and are spoken in the whole of the interior of British Columbia, in the neighbouring parts of Montana, Idaho, Washington Territory, and on the coast almost as far as the Columbia river. In the interior, only two dialects are met with, the Shushwap and the Kalispelm; on the coast, on the other hand, there are innumerable dialects; in British Columbia alone there are eight. As a prominent feature of the latter group may be mentioned the Bilchula, which is spoken more especially along Dean Inlet and Bentinck Inlet. The coast tribes are distinguished by a highly developed taste for the fine arts, which finds expression in their numerous carvings and paintings, and in the care taken by them in the construction of their houses and boats. The very varied origin of the civilisation of these tribes shows itself most prominently in the diversity of their social arrangements, which, in spite of long-continued reciprocal influences, comes out forcibly. Like most of the Indian tribes, the inhabitants of the north-west coast are divided into clans, which adopt mostly animals as totems. Their highly developed arts are wholly confined to representations of these totems, or to depicting myths having reference to the clans. Their arts are consequently quite incomprehensible without a knowledge of their clan divisions, and of their myths. Each clan possesses a part of the territory of the tribe as property over which it has the exclusive right to hunt, fish, and gather berries. Certain clans possess also important commercial privileges. The coast peoples may be separated into two groups, of which the more northerly comprises the Tlingit, Haida, and Tsimshian, and has its southern limit at Millbank Sound. Among the people of this group the tribe is divided into from two to four clans, which bear the names of animals. The clans are exogamic, that is to say, the members of the same clan may not intermarry. Thus a member of the "raven clan," among the Haida, is not allowed to marry a member of the "raven clan" of the Heiltsuk, although the parties are not related to each other by blood. The child belongs to the clan of the mother, and is under the protection of the uncle on the maternal side. The social division of the southern tribes is quite different. Each tribe is split up into numerous clans, only a few of which have animals as totems. Most of them trace back their origin to a traditional ancestor, and their totem has reference to certain heroic deeds of the said ancestor. Still further south the ideas of clan and village community almost coincide. With all these tribes the child belongs to the clan of the father. From a study of the languages, three groups can be recognised. The Haida and Tlingit belong to the first group, which is very poor in inflections. The Tsimshian forms the second group, the special characteristic of which is that all ideas are expressed by verbs. The most southern group is made up of the Kwakiutl, Nutka, and Salish. Manners and customs have everywhere broken through the linguistic boundaries. Among the Kwakiutl both of the social systems described above exist. The more northerly sections of the Kwakiutl possess the matriarchial system, while the southerly have the patriarchial, but in a particular form. The child inherits from the

father, but if the son marries he obtains all the privileges of his wife's clan, and becomes a member thereof. The children belong to the clan of the mother, although they inherit from the father. With this tribe one of the most important privileges of the clans is the membership of the great "Geheimbünde" or secret organisations, of which there is a considerable number. The right of membership is obtained through marriage with a daughter of an older member, and then follows the ceremony of initiation. These secret organisations, which play an important part in the lives of the Indians, belonged originally to the Kwakiutl, and have spread from them to the neighbouring peoples and flourish under various names which have been borrowed from the Kwakiutl, but the organisations and the dances and ceremonies connected with them have only been adopted by other tribes in a fragmentary way. With regard to the myths of these peoples, the sun, as everywhere in America, plays the chief part. But among the Tlingit and Haida, the raven also appears prominently in the myths. This bird creates the sun, moon, stars, earth, and men. The further south one goes the less important is the place of the raven in legends. With the Kwakiutl the secret organisations and the ancestral traditions have a very important place. Moreover, the Kwakiutl have a remarkable tradition of a son of the Deity, named Kankila, who travelled through the whole world and delivered it from monsters. A similar tradition exists also among the tribes living more to the south. With reference to the probable future of these richly gifted peoples, it may be said that their ethnographical peculiarities must in a short time succumb to the influence of the whites. The more quickly they adapt themselves to the altered conditions the better will be their prospects in the world-conflict with the white man. Races like the Kwakiutl, which shut themselves off so completely from intercourse with the white man, are doomed to destruction inevitably. Other races have already made themselves indispensable as labour forces, especially in fishery, and it is to be hoped that the Canadian Government will succeed, by improving the hygienic conditions so that the ruinous infant mortality may be lessened, and by making the Indians independent producers, in preventing the sad spectacle of the total extinction of gifted peoples, which the one-sided efforts of the missionaries are utterly unable to avert.—Dr. Walther (Jena) then spoke upon his geological journey to the east coast of East India and to Ceylon. In the course of his remarks he referred especially to Adam's Bridge, and gave a description of the temple of Rameswaram. Everywhere he received the most marked attention and assistance from the Indian authorities.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian R.G.S.*)

EUROPE.

Baedeker, K.—Norway and Sweden. Handbook for Travellers. With 23 maps and 13 plans. Fourth revised edition. Leipzig, Karl Baedeker; London, Dulau & Co., 1889: 12mo., pp. lxxx., 431, and 42. [Presented by Messrs. Dulau & Co.]

— Northern France, from Belgium and the English Channel to the Loire, excluding Paris and its environs. Handbook for Travellers. With 9 maps and 25 plans. Leipzig, Karl Baedeker (London, Dulau), 1889: 12mo., pp. xliii. and 395. [Presented by Messrs. Dulau & Co.]

The above handbook for Northern France, which appears for the first time, corresponds with the second French edition. It is based, as in the case of the

Editor's other Handbooks, on personal acquaintance with the country described. It includes the district to the north of the Seine and the Vosges; between the Seine, the Loire, and the Atlantic; and the district between Paris, the Vosges, the Jura, and the Loire. The maps and plans appear to be carefully executed.

[**The Elbe.**—Mittheilungen der Geographischen Gesellschaft in Hamburg, 1887–88. Heft ii. Die Ueberschwemmungen an der Unterelbe im Frühjahr 1888. Auf Grund örtlicher Ermittlungen dargestellt von Von Binzer. Hamburg, L. Friederichsen & Co., 1889: 8vo., map.

[**France.**—Das Französische Centralplateau. Eine Skizze seiner geologischen Entwicklung, von Dr. Fritz Frech. 'Zeitschrift der Gesellschaft für Erdkunde zu Berlin,' No. 140 u. 141, 1889.

[**Italy.** **Siro Corti.**—Le Provincie d' Italia studiate sotto l' aspetto Geografico e Storico. Torino, G. B. Paravia e Comp. 1887–1889. Nos. 1 to 32. Price 50 centesimi each.

These handbooks to the provinces of Italy cover from 48 to 64 pages each. Prefixed to each is a notice of the region or old province to which it belongs, Lombardy, Sicily, Tuscany, &c. The notice of the province is such as would be looked for in a detailed gazetteer of the country. There is a general account of the province in its various aspects, geographical, historical, industrial, commencing with notices of all towns and villages of any importance. There are a few illustrations and a map to each part.

Penck, Albrecht.—Die Ueberschwemmungen des Jahres 1888. Separat-Abdruck aus den Mittheilungen des D. u. Ö. A.–V. 1888. 12mo., pp. 19.

—— Die Gletscher der Ostalpen. Separatabdruck aus den "Mittheilungen des D. u. Ö. A.–V.," Jahrgang 1889, Nr. 3, 12mo., pp. 10.

—— Ziele der Erdkunde in Oesterreich. Vortrag, gehalten in der K. K. geographischen Gesellschaft in Wien am 22. November 1887. Wien und Olmütz, E. Hölzel, 1889: 8vo., pp. 16.

[**Switzerland.**—Internationale Erdmessung. Das Schweizerische Dreiecknetz herausgegeben von der Schweizerischen geodätischen Commission. Vierter Band. Die Anschlussnetze der Grundlinien. Zürich, S. Höhr, 1889: 4to., pp. 250, plate.

ASIA.

[**Dutch East Indies.**—Banda, Timor und Flores. Tagebuchnotizen von Prof. Ed. V. Mertens. 'Zeitschrift der Gesellschaft für Erdkunde zu Berlin,' No. 140 u. 141, 1889.

Although the journey referred to here was made twenty-five years ago, Prof. V. Mertens' notes are even now an important contribution to our knowledge of the islands with which they deal.

[**India.**—A Few Hints to Travellers in India. By an Anglo-Indian. London, Allen & Co., 1889: 12mo., pp. 105. Price 1s. [Presented by the Publishers.]

This little manual is written by a five years' resident in India, in the hope that it may be of service to persons going out for the first time. It seems likely to be of use for this purpose; it treats of such practically important matters as outfit, arms, the passage out in all its details, hotels, native servants, clothing, health, sport, climate, government, money, &c. &c.

AFRICA.

Ashe, Robert P.—Two Kings of Uganda; or, Life by the Shores of Victoria Nyanza. London, Sampson Low & Co., 1889: 8vo., pp. [xiv.] and 354. Price 6s. [Presented by the Publishers.]

Mr. Ashe's long residence in Uganda (or Buganda as he rightly names it) as a missionary gave him exceptional opportunities for becoming acquainted with the people. Of the country generally he seems to have seen little. The first four chapters are occupied with a narrative of the journey to Buganda by Msalala and across the lake. The bulk of the volume deals with the work of the mission and with the troubles which they had first with Mutesa (as Mr. Ashe spells it), and afterwards with his cruel weakling of a son Mwanga. Under Mutesa the missionaries were on the whole rather well off, notwithstanding his occasional caprices, though they were naturally shocked at his cruelties and by the horrible customs permitted by the social system of the country. We learn from Mr. Ashe's book all the internal movements that brought about the crisis, the results of which led to the abandonment of the mission and the break-up of this once-powerful state. Mr. Thomson's appearance near the borders of the country caused some consternation. The action of Germany on the East Coast inspired Mwanga with a dread that his country was to be eaten up by Europeans. These and other things led Mwanga to regard the approach of Bishop Hannington as really the advance of the enemy, and the result need not therefore surprise us. Mr. Ashe's story is certainly full of interest, while the chapters on the political condition of Buganda and on the manners and customs of the Baganda are an important addition to our knowledge of one of the most important native states in Africa. The few illustrations are not of a very high class, while the map is poor.

[Gold Coast.]—Further Correspondence respecting the Affairs of the Gold Coast. (In continuation of [C. — 5357], April 1888.) [C. — 5615.] London, Eyre & Spottiswoode, 1888: folio, pp. vi. and 181, maps. Price 2s. 6d.

Jeppe's Transvaal Almanac and Directory for 1889. Compiled by Fred. Jeppe. (Fifth year of issue.) Cape Town, 1889: 8vo., pp. x., 247, viii., and 79. [Presented by the Publisher.]

Mittheilungen der Afrikanischen Gesellschaft in Deutschland. Unter Mitwirkung des Vorstandes herausgegeben von Dr. W. Erman. Band v. Heft. 3, pp. 133–274. Berlin, Reimer, 1889. Price 6s. [Presented by the Society.]

This is the concluding part of the 'Mittheilungen' of the German African Society, which has been dissolved after having done much good work for the exploration of Africa. The principal contribution to the present number is Dr. R. Buttner's narrative of his expedition to West Africa in 1884–86, more particularly his land journey from San Salvador across the Quango to Stanley Pool, with accompanying maps. There are also maps of Stecker's journey on the south-east slope of the Abyssinian plateau, and the route-maps of Flegel's Niger-Binné journeys, with accompanying text by Dr. R. Kiepert.

Theal, George McCall.—History of South Africa: the Republics and Native Territories from 1854 to 1872. With a chart. London, Sonnenschein & Co., 1889: 8vo., pp. xv. and 448. Price 15s. [Presented by the Publishers.]

This volume, the third of the series, deals with events in South African history from 1854 to 1872, including an account of the wars between the Orange Free State and the Basuto tribe, and of the annexation of the Diamond-fields to the British dominions. The appendix consists of a memorandum on increase of the Bantu population of South Africa.

Werner, J. R.—A Visit to Stanley's Rearguard at Major Barttelot's Camp on the Aruwihimi. With an account of River-Life on the Congo. London, Black-

wood and Sons, 1889, 8vo., pp. xvi. and 337. Price 16s. [Presented by the Author.]

Mr. Werner was for two years (1886-8) an engineer in the employment of the Congo Free State. During this period he was almost constantly on the move up and down the river, so that he had favourable opportunities of seeing the country and of ascertaining the inner working of the various stations. The main geographical results of Mr. Werner's journeys have been given to the Society (see 'Proceedings' for June). In the volume before us we have a few more geographical notes, but much of it is occupied with details concerning Mr. Werner's own work as an engineer and with the condition of some of the stations which he visited, and the general condition of affairs. Mr. Werner was only a very few days at Major Barttelot's camp on the Arnwhimi. The construction of the camp he describes, and gives us a strong impression of the dismay which prevailed among the members of the rearguard at hearing nothing from their leader. Perhaps the most striking and novel thing he has to tell us is that just when he embarked on board his little steamer, the *A.I.A.*, to go up to Stanley Falls, the captain, a Belgian, told him that 'Tippo Tip had told his men that if Major Barttelot did not treat them properly they were to shoot him. The statement was confirmed from other quarters, and the fact seems to have been well known to several white men on the upper river. Yet no one seems to have thought it his duty to warn Major Barttelot. Mr. Werner excuses himself that he had to obey orders. Mr. Werner's book is readable. There are several good illustrations and a map of the Congo and its tributaries.

AMERICA.

[Canada].—Report of an Exploration of the Yukon District, N.W.T., and Adjacent Portion of British Columbia, 1887. By George M. Dawson, D.S., F.G.S. Montreal, Dawson Brothers, 1888: 8vo., pp. vi. and 277. [Presented by Dr. Dawson.]

This is the official report issued by the Geological Survey of Canada of the important exploration of the Yukon district recently carried out by Dr. Dawson, and some of the results of which have already been given in the 'Proceedings.' The purpose of the expedition was to obtain information on the vast and previously almost unknown tract of country which forms the extreme north-westerly portion of the Canadian North-west Territory. The Yukon district specially is bounded on the south by the northern line of the province of British Columbia (lat. 60°), on the west by the eastern line of the United States Territory of Alaska, on the east by the Rocky Mountain ranges and 136th meridian, and on the north by the Arctic Ocean. The greater part of this extensive region lies within the drainage area of the Yukon. The total area of the region above defined is approximately 192,000 square miles, of which, according to the most recent information, 150,768 square miles is included in the basin of the Yukon. Besides the main party under Mr. Dawson, several subsidiary parties were sent out, so that considerable additions have been made to our knowledge of a region that is at least interesting to the geographer. The main geographical results of the Yukon expedition, in so far as they are covered by the present report, are very fully shown in the line series of maps accompanying the volume. In addition to the instrumentally measured line from the head of the Lynn Canal to the intersection of the Yukon or Pelly by the 141st meridian, there is now an instrumental survey of the Sitkine from its mouth to the head of navigation (Telegraph Creek), which is connected with Dease Lake by a carefully paced traverse. This is connected by a detailed running or track survey, following the lines of the Dease, Upper Liard, and Pelly rivers, and connecting with Mr. Ogilvie's line at the mouth of the Lewes, the total distance from the mouth of the Sitkine to this point, by the route travelled, being about 944 miles. Adding to this the distance from the mouth of the Lewes back to the coast at the head of Lynn Channel (377 miles), the entire distance travelled by the expedition amounted to 1322 miles. This, taken in connection with the coast-line between the Sitkine and Lynn Canal, circumscribes an area of 63,200 square miles, the interior of which is still; but for the accounts of a few prospectors

and reports of Indians, a *terra incognita*. Along the line mentioned numerous points have been carefully fixed for latitude, and a considerable number of chronometer longitudes been obtained. Special attention was paid to the sketching and fixing of mountain topography in sight from the line of travel, and the approximate altitudes of a number of the more prominent peaks were ascertained. The region as a whole, being a portion of the Cordillera belt of the west coast, is naturally mountainous in general character, but it comprises as well important areas of merely hilly or gentle valley country, besides many wide flat-bottomed river-valleys. It is, moreover, more mountainous and higher in its south-eastern part (that drained by the Sitkine and Liard), and subsides gradually and apparently uniformly to the north-westward, the mountains at the same time becoming more isolated, and being separated by broader tracts of low land. The general base-level, or height of the main valleys, within the coast ranges, thus declines from about 2500 feet to nearly 1500 feet at the confluence of the Lewes and Pelly rivers, and the average base-line of the entire region may be stated as a little over 2000 feet. Disregarding minor irregularities, it is found that the lines of the main mountain ridges and ranges show throughout the entire region a general parallelism to the outline of the coast. Dr. Dawson was disappointed with the size of the Yukon where he saw it at the confluence of the Lewes. The river is there, when uncrowded by islands, about 1700 feet only in width, with a maximum depth scarcely exceeding 10 feet when at its mean. He believes that the Mackenzie must far exceed the Yukon in volume. The drainage area of the Yukon is only 330,912 square miles, as compared with 677,400 square miles of the Mackenzie.

Markham, Clements R.—*Sul punto d'approdo di Cristoforo Colombo*. Roma, 1889: large 8vo., pp. 26, map.

Smith, F. Hopkinson.—*A White Umbrella in Mexico*. With illustrations by the Author. London, Longmans & Co., 1889: 12mo., pp. viii. and 227. Price 6s. 6d. [Presented by the Publishers.]

An account of an artist's experiences in Mexico, with descriptions of Guanajuato, Silao, Querétaro, Aguas Calientes, Zacatécas, the City of Mexico, Puebla, Toluca, Morelia, Pátzcuaro, and Tziutzuntzan.

Storm, [Professor] Gustav.—*Studies on the Vineland Voyages*. 'Mémoires de la Société Royale des Antiquaires du Nord,' nouvelle série, 1888, 8vo., pp. 307-370. Copenhagen.

This is a rediscussion in English, by Professor Storm, of all the evidence up to date as to the old Norse voyages to America. The first section of the Memoir deals with the present standpoint of research. It is followed by sections on Adam of Bremen; the earliest Icelandic accounts; the Saga of Erik the Red, and the Grœnlendingaþáttir of the Flateyjarbók; the Vineland Voyage; the Icelandic map of the N. Atlantic; the Geography of Helluland, Markland, and Vineland; Fauna and Flora; Great Ireland. Judging exclusively from topographical data, Professor Storm concludes that Helluland may have been Labrador (or the Northern Peninsula of Newfoundland); Markland, Newfoundland; and Vineland, Nova Scotia along with Cape Breton Island. The memoir is an important contribution to the subject of which it treats.

[**United States.**].—[Tenth Census of the United States, 1880.] Vol. xxi. Report on the Detective, Dependent, and Delinquent Classes of the Population of the United States, as returned at the Tenth Census (June 1, 1880), by Frederick Howard Wines, Special Agent.—Vol. xxii. Report on Power and Machinery employed in Manufactures, &c., &c. Prof. W. P. Trowbridge, Chief Special Agent. Also Report on the Ice Industry of the United States, by Henry Hall, Special Agent. Washington, Government Printing Office, 1888: 4to., illustrations.

[**Wyoming.**].—*Resources of Wyoming, 1889*. An official publication compiled by the Secretary of the Territory Containing descriptive statements and

general information relating to the Soil, Climate, Productions; Advantages and Development—Agricultural, Manufacturing, Commercial and Mineral—Geography and Topography of the Territory. The vacant Public Lands, and how to obtain them; together with a map of Wyoming, illustrations, the Mining Laws of the Territory, and descriptions of each county separately. Cheyenne, Wyoming, 1889: 8vo., pp. 77.

Zeballos, Estanislao S.—*Descripcion Amena de la República Argentina.* Tomo iii. A traves de las Cabañas. Buenos Aires, and La Plata, J. Peuser, 1888: 8vo., pp. 335 and xii., illustrations. [Presented by the Author.]

This volume largely deals with the industrial and agricultural conditions of the Argentine Republic.

OCEANIA.

[**Samoa.**]—Notes pour servir à une monographie des Iles Samoa. 'Boletim da Sociedade de Geographia de Lisboa,' 8a. serie, Nos. 1 and 2. Lisbon, 1888-89, 8vo., pp. 158.

This is a lecture delivered to the Lisbon Geographical Society by M. A. Marques, and is a useful summary of our knowledge of the Samoan group and its inhabitants. It is accompanied by a map on the scale 1:454,000.

— No. 1 (1889). Correspondence respecting the Affairs of Samoa, 1885-89. [C.—5629.] London, Harrison & Sons, folio, pp. xv. and 308, maps. Price 4s. 2d.

GENERAL.

Colonial Conference, 1887.—Proceedings of the Colonial Conference, 1887, vol. i. and vol. ii. (Appendix). London, Harrison and Sons and Eyre and Spottiswoode, 1887: folio, pp. (vol. i.) xiii. and 562; vol. ii. (Appendix), vi. and 338. Price 6s., and 3s. 10d.

[**Geodetic Institute.**]—Veröffentlichung des Königl. Preussischen Geodätischen Instituts. Lotabweichungen in der Umgebung von Berlin. Berlin, P. Stankiewicz, 1889: 4to., pp. vi. and 155, plates.

Hall, [Rev.] Alfred J.—A Grammar of the Kwagiutl Language. From the Transactions of the Royal Society of Canada, vol. ii., section ii., 1888. Montreal, Dawson Bros., 1889: 4to.

Hann, [Dr.] J.—Ueber die Luftfeuchtigkeit als klimatischer Factor. (Sep. Abdr. aus der Wiener Klin. Wochenschr, 1889, No. 18-19. Verlag von Alfred Holder, Wien.

Penck, Albrecht.—Theorien über das Gleichgewicht der Erdkruste. Ein Vortrag gehalten im Vereine zur Verbreitung naturwissenschaftlicher Kenntnisse in Wien den 27. Februar 1889. Wien, 1889: 12mo., pp. 26.

Rousdon Observatory, Devon.—Volume V. Meteorological Observations for the Year 1888, made under the superintendence of Cuthbert E. Peek, M.A., F.R. MET. SOC., F.R.A.S. London, printed by Sir J. Causton & Sons, 1889: 4to., pp. 191. [Presented by Mr. Peek.]

Schweiger-Lerchenfeld, Amand [Freiherr von].—Das Mittelmeer. Freiburg im Breisgau, Herder, 1888: 8vo., pp. ix. and 316.

This a popular book on the Mediterranean and the countries around its shores. The region is an important one and full of interest, and the author seems to have dealt conscientiously and competently with some of its most instructive aspects. The first section of the work treats of the physical conditions of the Mediterranean. This is followed by a section which deals with

the changes that have taken place in the Mediterranean populations; while a third deals in some detail with the populations of the present day. The second half of the book treats of the various landscapes typical of the Mediterranean—European, Asiatic, and African. A few pages in conclusion are devoted to trade and commerce. There are over 50 illustrations and a fairly good map showing the trade of the Mediterranean.

Woeikof, Alexander.—*Der Einfluss einer Schneedecke auf Boden, Klima und Wetter.* "Geographische Abhandlungen" herausgegeben von Prof. Dr. Albrecht Penck. Band iii. Heft 3. Wien, Hölzel, 8vo., pp. iv. and 115. [Presented by the Publisher.]

This is an expanded translation of Professor Woeikof's memoir noticed in the 'Proceedings' for 1886, p. 130. It is divided into nine chapters, treating of the temperature of snow and its influence on the soil; influence of a snow-sheet on the temperature of the atmosphere; fourteen years' observations on the duration of a snow-sheet at Upsala; influence of a snow-sheet on temperature over 0° C., and the cause of thaw; influence of a snow-sheet on the mean temperature of winter: thaw, height and density of the snow, duration of the snow-sheet; mountain snow; influence of a snow-sheet on atmospheric moisture; general results of the inquiry. In general the effect of a layer of snow is to raise the temperature of the ground and lower that of the atmosphere; the ultimate effect of snow is to preserve or increase the temperature of the earth.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Alps.—Michel's *Alpen-Karte von Nord-Italien und Süd-Tyrol nebst Theilen von Krain, Kärnthen und der Schweiz.* Scale 1:600,000 or 8·2 geographical miles to an inch. München, J. A. Finsterlin. Price 1s. (*Dulau.*)

Deutschen-Reiches.—*Karte des —.* Scale 1:100,000 or 1·3 geographical miles to an inch. Sheets:—523, Trier; 642, Gebweiler. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1889. Price 1s. 6d. each sheet. (*Dulau.*)

England and Wales.—*Modern Map of —,* constructed by W. & A. K. Johnston, Edinburgh and London. 1:443,520, or 6·1 geographical miles to an inch.

All means of communication are clearly laid down on this map, and the distances by sea to the principal Continental and other ports are given. The Channel Islands and the Scilly Islands are shown on inset maps. County boundaries are indicated more clearly than is usual in maps of this class, and the hill work, though sufficiently expressed, does not render the map indistinct; the lettering is clear, and the names given are well chosen, and the railways have all been brought up to date.

Norway.—*Topografisk kart over kongeriget Norge.* Scale 1:100,000 or 1·3 geographical miles to an inch. Sheets:—15n, Sitskogen. 19n, Gran. 20n, Kongsvinger. 23a, Voss. 31n, Gausdal. 42a, Opdal. 43n, Aursunden. 48n, Frøien. 51c, Jævsjø. 54n, Nordli. 54n, Tunnsjø.

— *Generalkart over det sydlige Norge i 18 Blade.* Scale 1:400,000 or 5·6 geographical miles to an inch. Sheet IX. Udgivet af den geografiske Opmaal in Kristiania, 1888.

Norway.—Den Geologiske Undersøgelse. Scale 1:100,000 or 1·3 geographical miles to an inch. Sheets:—15A, Eidsberg. 26c, Aamot. 20c, Eidsvold. 46A, Ridalen. Udgivet af Norges geografiske Opmaaling.

— Kristiania Omegn. Scale 1:25,000 or 2·9 inches to a geographical mile. Bl. VI. Udgivet af Norges geografiske Opmaaling. (*Dulau.*)

Russia.—Dislokationskarte der Russischen Armee (im europäischen Reichstheile) nebst tabellarischer Übersicht der "Ordre de Bataille" und der Armeeverhältnisse im Frieden, in der Mobilisirung und in Kriege und der wichtigen Veränderungen im Jahre 1888 und Anfangs 1889. Nach dem officiellen russischen Truppen-Verzeichnisse "Rossissanie," bearbeitet vom k. k. Oberlieutenant Eugen Schuler. Scale 1:4,500,000 or 62·5 geographical miles to an inch. Zweite Auflage. Wien, Artaria & Co. 1889. Price 4s. 6d. (*Dulau.*)

The first edition of this map was noticed in the 'Proceedings,' June 1888. It is a document of considerable interest from a military point of view, showing as it does the numbers, composition, and positions of the several Russian army corps. The map is accompanied by letterpress containing statistics.

Russland.—General-Karte vom europäischen —, von F. Handtke. Scale 1:5,000,000 or 66·6 geographical miles to an inch. Glogau, Flemming. Price 1s. 6d. (*Dulau.*)

— Eisenbahn-Karte von —, von G. F. Raab. Scale 1:4,750,000 or 65 geographical miles to an inch. Glogau, Flemming. Price 1s. (*Dulau.*)

Sweden.—Generalstabens karta öfver Sverige. Scale 1:100,000 or 1·3 geographical miles to an inch. Sheets:—35, Jönköping. 43, Skara. 63, Rosenborg. 64, Åskersund. 71, Karlstad. 1887-88.

— Högdkarta öfver södra och mellersta Sverige utgifven af Generalstabens topografiska afdelning. Scale 1:500,000 or 6·8 geographical miles to an inch. Sheets I., II., III., IV., VI.

— Karta öfver Norrbottens Län. Scale 1:200,000 or 2·7 geographical miles to an inch. Sheets:—Rostojaura. 2, Naimakka. 3, Sjangeli. 4, Torneträsk. 5, Soppero. 6, Karesuando. 7, Akka. (*Dulau.*)

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AFRICA.

Afrique.—La Carte d' —. Scale 1:2,000,000, or 27 geographical miles to an inch. Sheets: No. 19, Agadez; No. 28, El Obeid; No. 36, Lado. Dressé et dessiné par le Chef de Bon. du Génie, Regnaud de Lannoy de Bissy. Publié par le Service Géographique de l'Armée en 1888. Price 6d. each sheet. (Dulau.)

Algérie.—Carte Topographique de l' —. Scale 1:50,000 or 1·4 inches to a geographical mile. Dressé, gravé et publié par le Service Géographique de l'Armée, Paris. Sheets: 10, Cap Sigli; 57, Cap Magroua; 89, El Esnam; 152, Les Andalouses. Price 1s. each. (Dulau.)

Congo Free State.—Dr. Richard Büttner's Reise von S. Salvador nach dem Quango and Stanley Pool (Juli-September, 1885). Gezeichnet von Richard Kiepert. Scale 1:500,000 or 20·4 geographical miles to an inch. Mitth. der Afrikan. Ges. in Deutschland, Bd. v., Taf. 9. (Dulau.)

— Aufnahme des unteren Quango von Dr. Menze, 1886. Construit von P. Sprigade. Scale 1:300,000, or 4·1 geographical miles to an inch. Mitth. der Afrikan. Ges. in Deutschland, Bd. v., Taf. 10. (Dulau.)

Kiepert, Richard.—Eduard Robert Flegel's Reisen im Gebiete des Benué (1882–1884). Nach seinen Tagebüchern und Entwürfen. Construit von Richard Kiepert. Scale 1:500,000, or 6·8 geographical miles to an inch. On 3 sheets. Mitth. der Afrikan. Ges. in Deutschland, Bd. v., Taf. 6, 7 u. 8. (Dulau.)

Transvaal, or South African Republic.—Map of the —, and surrounding Territories, by Fredk. Jepp, F.R.G.S., &c. Pretoria, S.A.R. 1889. Scale 1:1,000,000 or 13·6 geographical miles to an inch. London, Dulau & Co. Price, in 4 sheets, 27. 2s.

Since the first appearance of this map, many changes have taken place in that portion of South Africa which it represents. The development of the gold-fields, with its consequent influx of immigrants, the extension of railways, the establishment of townships, and the alteration in boundaries, have all combined to necessitate the publication of another revised edition. This has been done, and the map now appears corrected, extended in area, and drawn on an enlarged scale. In its compilation, the author has made use of the most recent and

reliable material, and has received assistance from the several surveying staffs. The present edition embraces the South African Republic, the Orange Free State, the Cape Colony, and Natal north of the 31st parallel of south latitude, the Gasa country, a portion of the Portuguese territory, Khama's country, and Matabele land. Inset plans are given of the De Kaap, Witwatersrand, and Zoutspanberg gold-fields, together with an index of registered mining leases.

AMERICA.

Süd-Amerika.—General-Karte von —, von F. Handtke. Scale 1 : 13,000,000 or 178 geographical miles to an inch. Glogau, Flemming, Price 1s. (*Dulau.*)

CHARTS.

Norwegian Charts.—Fiskekart over Varangerfjorden udgivet af Norges geografiske Opmaaling, Kristiania. Scale 1 : 100,000 or 1·3 geographical miles to an inch. 3 sheets.

Specialkart over den Norske Kyst fra Lövö til Halten og Terningen, udgivet af Norges Geografiske Opmaaling, Kristiania. Scale 1 : 50,000 or 1·4 inches to a geographical mile. (*Dulau.*)

United States Charts.—No. 1129, Great Circle Sailing Chart of the Indian Ocean. 1889.—Pilot Chart of the North Atlantic Ocean. May and June, 1889. Published at the Hydrographic Office, Navy Department, Washington, D.C., Lieut. G. L. Dyer, U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Bartholomew, J., F.R.G.S.—The Pocket Atlas and Guide to Paris, by —, London, John Walker & Co., 1889. Price 1s.

— The Pocket Atlas and Guide to London, by —. London, John Walker & Co., 1889. Price 1s.

These little atlases are both compiled on the same plan. They commence with several pages of statistical and general information, next follow special maps of the environs, and then sectional street plans; twelve of these latter are given for Paris, on the scale of three inches to the mile, each section being divided into half-mile squares, and nine for London on the scale of two inches to the mile, each section being divided into mile squares. An additional map is given of the Thames to Windsor, and in the atlas for Paris, a plan of the Exhibition. Each of these atlases is furnished with a copious index; the maps are clearly drawn, and they are of such handy size that they can easily be carried in the pocket.

Hachette et Cie.—Atlas de Géographie Moderne, édité par —. Ouvrage contenant 64 Cartes en couleur, accompagnées d'une Texte Géographique, Statistique et Ethnographique et d'un grand nombre de Cartes de Détail, Figures, Diagrammes, etc., par F. Schrader, F. Prudent et E. Anthoine. Paris, Librairie Hachette et Cie. 1889. Price of each part, containing three maps, 10d. (*Dulau.*)

This atlas is to be completed in twenty-four parts, each of which will contain three maps and explanatory letterpress, with the exception of the last issue, which is to contain four maps and an alphabetical index. The maps in the present part are Switzerland, the Russian Empire, and the British Isles, each of which, according to the design of the publishers, has some very useful information with regard to topography, hydrography, climate, geology, population, &c., on its reverse side. Each of these notes is illustrated either by a plan or a diagram, and the whole makes a most valuable addition to the maps, which are drawn in a very effective style.

In the editor's introduction a series of excuses appear for the length of time that has elapsed since the appearance of the first issue of M. Vivien Saint

Martin's 'Atlas Universel.' This is mentioned as being ten years, which is incorrect, the actual time being twelve years, and during that extended period only 24 maps have been published out of 110, which will complete the atlas; and the subscribers are now told that though all the maps are nearly ready, it has been deemed advisable to utilise the material thus collected in the formation of the cheaper atlas, which is the subject of this notice, and the public are called on by the editors of the 'Atlas Universel' to exercise patience, as some time must yet elapse before it will be possible to complete it. When it is considered that Stieler's excellent Hand-Atlas has, during the time occupied by M. Vivien Saint-Martin in issuing 24 sheets, gone through one edition, and after a lapse of years, is again well on in another, the maps of which are in all respects equal to any atlas maps that have ever been published, it is not a matter to be wondered at that subscribers to the M. Vivien Saint-Martin's Atlas should not only feel, but at times give expression to their feelings of disappointment.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von ——. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Zwölfte (12) Lieferung. Inhalt: Nr. 36, Spanien und Portugal, Blatt 4 in 1:1,500,000 von C. Vogel. Nr. 67 Afrika, Blatt 2 in 1:10,000,000 von B. Domann. Nr. 85, Vereinigte Staaten, Blatt 3 in 1:3,700,000, von A. Petermann. Gotha, Justus Perthes, 1889. Price 1s. 6d. each part. (*Dulau.*)

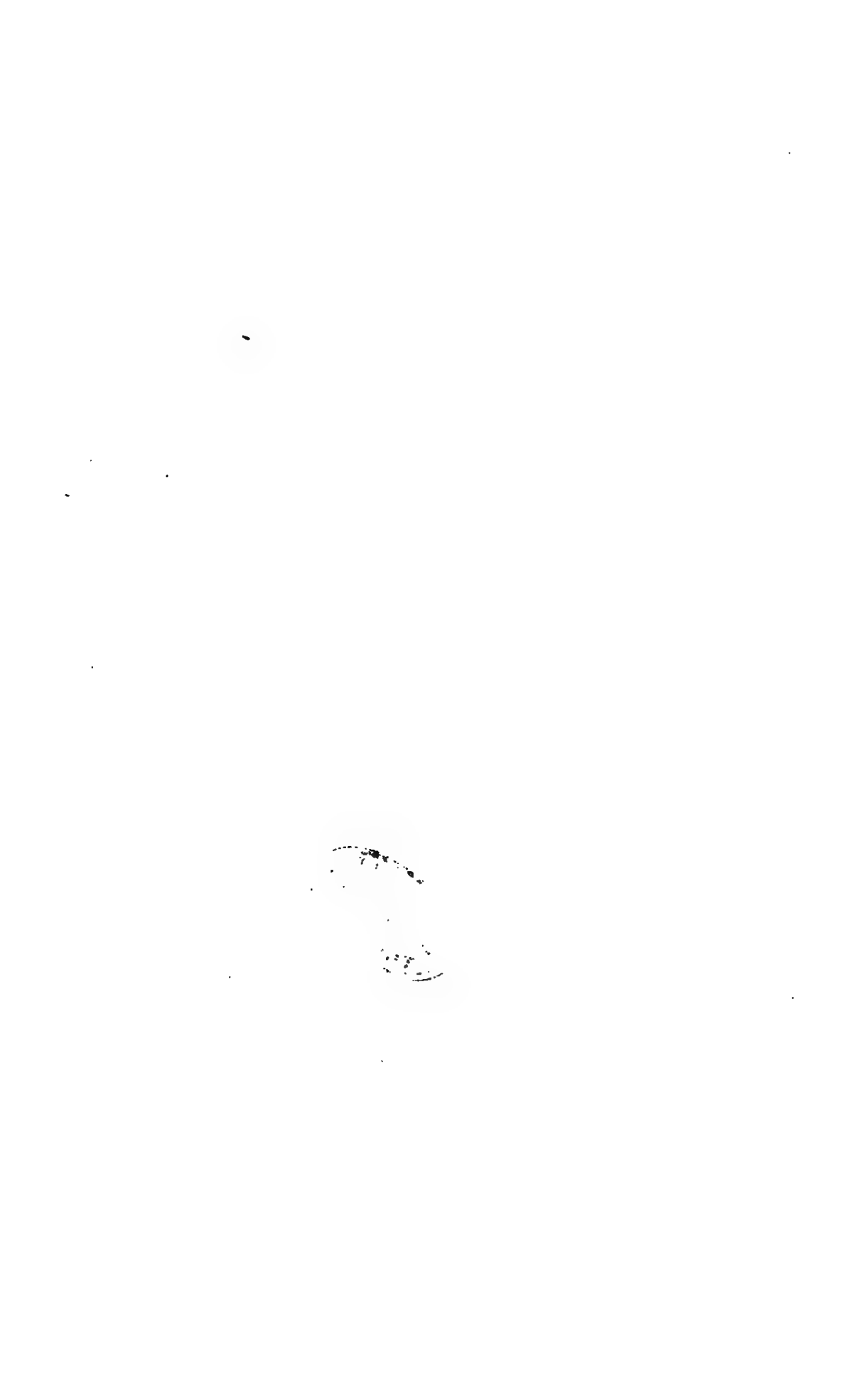
Sheet No. 35 contains the south-eastern portion of Spain, the coast of Algeria from Cape Oussa to Cape Bengut, the island Iviza, and the extreme south of Majorca. Maps of Madeira and the Canary Islands, and a plan of Madrid and its environs are given on insets. Elevations and soundings are given in metres, the latter being indicated by contours, which show the depth of the sea from 20 to 1000 metres. Sheet 67 is sheet No. 2 of the new map of Africa which is in course of publication in the present edition of this atlas; it contains parts of North-eastern Africa, Arabia, Eastern Europe, and Asia Minor; there are also inset plans, on enlarged scales, of the Suez Canal, Alexandria and its environs, the pyramids of Gizeh, and Cairo and its environs. No. 85 is sheet No. 3 of a six-sheet map of the United States; it also contains a considerable portion of the eastern part of the Canadian Dominion. Very small plans are given of Boston and New York, so small indeed that, though they may serve to fill up the sheet, they can be of little service to any one.

MAH OR MT. ST. ELIAS.

Harold W. Topham.

----- Author's Route.







22. 10. 1914

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Journey across the Inland Ice of Greenland from East to West.

By Dr. FRIDTJOF NANSEN.

(Read at the Evening Meeting, June 24th, 1889.)

Map, p. 524.

SINCE Greenland was discovered about nine hundred years ago, the interior of that continent has remained a mystery to Europeans as well as to the Eskimos, and many are the opinions and suggestions which have been put forth as to its real nature. Our forefathers, the old Vikings, who first discovered Greenland, maintained that it was only the land near the coasts which was not ice- and snow-clad, whilst the interior was covered with a sheet of ice so thick that only in some few places could you see the ground underneath. This is, indeed, a fairly correct view, and until quite recently nobody knew more of it than this.

Many attempts have been made to penetrate into this mysterious interior. I shall here only briefly mention a few of them.

The first expedition known of was one undertaken in the middle of last century by a Dane, Paars, who was major in the Danish army, and the first, and last, Governor of Greenland. He was sent by the Danish Government, with an escort of about twenty soldiers, with wives and children, twelve horses, guns, &c., and was ordered to cross Greenland on horseback from the west coast, and when he reached the east coast to build a fortress, found a colony, and take care of the old Norsemen who were thought still to survive. I need not tell you that this expedition only reached the inland ice, and returned filled with horror. Major Paars wrote a very vivid description of the fearful dangers that would be encountered on an expedition on the inland ice. The impossibility of crossing Greenland was at once settled. Notwithstanding this there have been a great many attempts since that time.

Another Scandinavian, Dalager, who also lived in the last century, was more fortunate, and really walked over the ice several miles. Several Norwegians and Danes have also made the attempt this century, but did not succeed. In 1867 two well-known Englishmen, the famous

alpinist, Whymper, and Dr. Robert Brown, also tried to penetrate into the interior, but were unfortunate. They met with very difficult ice, and were obliged to return when some few miles from the coast.

More fortunate were the following expeditions:—that of Baron Nordenskiöld in 1870; the Danes, Captain Jensen, Kornerup, and Groth, 1878; Nordenskiöld again in 1883; and the American Peary with the Dane Maigaard in 1886. These last reached about 100 miles from the coast, and a height of about 7500 feet.

All these attempts were made from the west coast, but from the little-known east coast nobody had tried so far as is known.

How the plan of my expedition across Greenland was ripened in my youthful brain I shall not try to explain here. I got the idea one day in 1882, whilst on board a Norwegian sealing ship; we were ice-bound for twenty-four days near the still unknown part of the east coast of Greenland, and from that time I could not get it out of my mind.

My opinion was that if an expedition was fitted out in a proper way it was not at all an impossibility to cross Greenland, and that the very men for such an expedition would be Norwegian "ski-runners." The Norwegian snowshoes called "ski" are just the thing for traversing snow-fields, and that snow would be found in the interior of Greenland I never doubted. But there was another thing which also in my opinion was of the greatest importance, and that was the place from which to start. If we started from the west coast of Greenland I was quite sure we should not be able to cross, for then we should have the flesh-pots of Egypt behind us, and in front of us would be the ice-desert and the east coast, which is not much better, and when we reached this coast we should have to cross again to the west coast to be rescued. Even if one could keep up his own spirit to this he might not be able to force his men forward when the food began to decrease.

I thought the only certain way was to penetrate the floe-ice and land on the desolate and ice-bound east coast between 65° and 66° N. latitude, and make that the starting-point for the inhabited west coast; in that way we should, as it were, burn all bridges behind us, and it would not be necessary to force the men forward, for they would certainly have no temptation to return, whilst in front of us we should have the west coast inviting us with all the comforts of civilisation. The men had no choice, only forward. Our order was death or the west coast of Greenland. In this way was it accomplished.

When I first put forth my plan to cross Greenland most people said I was either mad or tired of life. Neither was, however, the case, and, notwithstanding all warnings, more than forty men offered to accompany me. I selected three Norwegians, viz. Captain Sverdrup, Lieut. Dietrichsen, and a peasant, Kristian Kristiansen Trana. From Lapland I got two Lapps, Samuel Balto and Ole Ravna, who I hoped would in various respects be of use to us, but I was rather

disappointed; they were good and strong men, but Norwegians would have done just as well, and in dangerous positions they were easily frightened.

I must here acknowledge the liberality of Mr. Gamél, of Copenhagen, who contributed largely to the expenses of the expedition.

In the first days of May last year the expedition started from Christiania, and sailed viâ Scotland and the Faroe Islands to Iceland, where we on the 4th of June embarked on board the Norwegian sealing ship *Jason* for the east coast of Greenland.

The coast of Greenland was not, however, so easily reached as we had expected, the floe-ice occurring in larger quantities than it generally does. For six weeks we had to wander about in the ice between Iceland and Greenland before we could approach the coast near enough to induce us to leave the ship.

It was on the 17th July that we left the ship in the ice near Cape Dan, outside the Sermilik fjord. A salute from the guns of the *Jason* announced to the solemn and silent ice-world that we were burning our last bridge and bidding farewell to civilisation and comfort. From this moment we had to take our own way. It was with strange feelings that we six men parted from our friends on board the ship and steered our two boats into this desolate ice-world, which now was going to be our home for a long time. We had, however, all of us the best hope of succeeding; that dangers and hardships were coming we knew, but we felt sure that we should overcome them.

The first thing we had to do, and a very important thing indeed, was to reach land. But before we could do this, we had to force our way through an ice-pack of about ten or twelve miles' breadth, and this was one of the most difficult parts of the whole journey. I had originally hoped to penetrate the ice in one or two days, but we met quite unexpectedly with a strong and dangerous current which pressed the ice-floes against each other, and we had to take great care that our boats were not crushed; to make it more difficult we got for some time fog and heavy rain. In spite of all this we advanced for about twenty hours rather rapidly towards land. I could see the stones on the shore, and was already quite sure of reaching it within a short time, when we had the misfortune of getting one of our boats crushed during an ice-pressure; it could not float, and we were obliged to take it up on a floe to get it mended. This required several hours, and in the meantime we were swept southwards by the rapid current; the distance from the land grew rapidly, and the speed with which we were swept along was so great that it was in vain to try to struggle against it. We had nothing left but to take leave of the beautiful mountains and the glaciers round the Sermilik fjord, and to look out for another landing-place, or perhaps meet destruction in the floe-ice, with its capricious currents, which soon carried us towards land, but soon again towards the open

sea. To make the position still more awkward, we got heavy rain which wet us through to the skin. We could do nothing better than pitch our tent on the ice-floe and creep into our sleeping bags to take a sleep, which, after twenty hours' constant hard work in the ice, was rather welcome.

I shall not tire you with a description of our drift along the east coast of Greenland; how we dragged our boats over the ice-floes, how we worked hard and tried to force our way towards land, how, in the nights, with those charming Arctic sunsets which call forth in your mind all your most tender feelings and dreams of your childhood, how we could then be seen casting longing looks towards that wild and beautiful coast, from which we were parted only by some few miles of vexing ice.

I will not tire you with a description of how often we hoped to land, how often we were disappointed, and how often we were nearly wrecked in the ice; the worst of it was, that the precious summer-time was passing away, and we were not able to use it; the difficulty of carrying out our plans grew greater every day.

That you may get an idea of what risks one runs in such ice-currents, I will tell you our experiences of one day and night only. One morning we observed that we were being rapidly carried by a strong current towards the open ocean, where a heavy sea was coming from east down upon us; it was in vain to try to drag our boats over the floe-ice against this current; it was inevitable that we must come into the dangerous breakers at the margin of the ice, where it was impossible to stick to the ice. The ice-floes were smashed to pieces all around us; our own floe was broken into several pieces, we had nothing to do but select the strongest ice-floe we could find in the neighbourhood and to prepare with our utmost determination for a hard struggle for life. We got a strong floe, brought all our things and provisions into our two boats, which were standing on the ice-floe, only our tent and two sleeping bags were still left for use on the ice. Towards night all was ready; we were then some thousand yards from the open sea, we could only too distinctly see how the ice-floes were washed over by the heavy breakers so that everything was swept away, how they were broken to pieces and then almost crushed into dust; within a few hours we should be at the outside margin, there would be nothing left but to try to get our boats through the breakers and enter the open sea; but as it was best to face this struggle with as fresh energies as possible, all the men were ordered to sleep except one, who should keep watch and call us when it would no longer be possible for us to maintain our position. While Captain Sverdrup took the first turn, we crept into our sleeping bags, and, as we were tired—all of us—we fell fast asleep within a few minutes. Even the Lapps slept well though they had been dreadfully anxious all the day, and were quite sure they had seen the sun setting

for the last time; one of them, who did not find the tent safe enough, slept in one of our boats, and did not even awake when the breakers very nearly had swept the boat away, so that Sverdrup was obliged to hold it.

After some time I was awakened by hearing the breakers roar just outside the tent; I expected to hear Sverdrup call, or to see the tent swept away, but Sverdrup did not call and the tent stood; I heard the thunder of the breakers for some time, but then I do not remember anything more. I fell asleep again and did not awake until next morning, when I was most astonished to discover that we had again approached land, and were far distant from the open sea.

Sverdrup told me now that our position had been rather awkward for some hours in the night; we had had a large mass of ice on our side, which threatened to crush our floe every moment, and the breakers swept over our floe on all sides, only the spot where the tent was standing was spared. Once he came to the tent door to call us, he unfastened one hook, but then thought he would still look at the next breaker coming; this was worse than the former one, he returned to the tent, unfastened one hook more, but thought it best to wait and watch what the next breaker would be like. He did not unfasten any more hooks. Just at the decisive moment the current turned and we were again carried towards land, away from the dangerous breakers.

On the 29th of July we landed at Anoritok, which is, however, not very far from the south point of Greenland, and is situated in $61\frac{1}{2}^{\circ}$ N. lat., consequently about 250 miles south of the place where we intended to begin our journey across the continent. It was now very late in the season; the best time of the short Greenland summer had passed away, there was but little left. It would have been very easy to reach the Danish settlements on the west coast near Cape Farewell, and northwards the floe ice was pressed tightly against the coast all the way. We had to choose here between certain rescue in the south and the accomplishment of our plans or perhaps death in the north. If I had asked my two Lapps I was sure of the answer, it would have been southwards on any condition; but if I had asked my brave Norwegians I was just as sure that the answer would be "northwards," we must not on account of any risk give up our plans. None of them were, however, asked; arrived inside the ice, the boats were steered northwards without any order, there were no thoughts of giving up our plans yet, there was still left time enough to cross Greenland if we did our best. I shall never forget the sensations that possessed us when we passed the last floe which parted us from land, it was as if we had escaped a long and dreary prison and saw life lying bright and gay before us.

And certainly life was bright, but I will not say we had much comfort, or rather much time to enjoy it; the order of the day was to sleep as little as possible, eat as little and as quickly as possible, and to

work as much as possible. Our food was water, biscuits, and dried meat—for cooking or procuring fresh meat we had no time, though there was game enough. The ice was very difficult, we often had to break our way through it by help of axe and poles. It often looked almost hopeless; it would take us hours to advance some few feet, but we advanced, and that is always better than to go backwards, and I had five brave companions who did not give it up. On the way we met with several encampments of heathen Eskimos living on this desolate coast. We hoped to get some help from them, but they could not advance through the ice so well with their skin boats as we could with our wooden ones, and we were obliged to leave them.

At last, on the 10th of August, we reached a place called Umivik, where I thought it convenient to begin our overland journey. After having examined the glaciers in the neighbourhood and found a good way, and after having made everything ready, we left our two boats on the coast and started on our journey across the unknown interior of Greenland. Our destination was the Danish settlement Christianshaab, at Disco Bay.

We had five sledges; the load on four of them was about 200 lbs. each, and on the fifth about double as much. The last was pulled by Captain Sverdrup and myself, who took the lead, the other four members of the expedition following, each pulling one sledge. Our food consisted principally of dried beef, pemmican, meat-biscuits, dried bread, butter, pâté de foie gras (not the Strasburg luxury), meat-chocolate, common chocolate, tea, &c. Besides provisions, we had on our sledges scientific instruments, guns, Norwegian snowshoes (called *ski*), Canadian snowshoes, alpine axes and walking-sticks, alpine ropes, one tent for all six, and two sleeping bags of reindeer skin; as we slept three men in each bag, they were very warm, and we could stand the very low temperatures experienced, sleeping directly on the snow.

Notwithstanding the very steep slopes we had to climb, and the many crevasses, &c., we advanced rather rapidly for two days, then we were stopped by a storm from the north, with heavy rain, and we had to stay in our tent lying down in our sleeping bag for three days, while the ice melted rapidly under us, and the rain poured down above.

At first the snow was very uneven, but hard and good for sledge-pulling. There were plenty of dangerous crevasses, so that we had to be vigilant; no accidents happened, however; occasionally some one fell up to the arms through the snow-bridges by which we had to pass over the large crevasses, but by help of the alpine axes a deeper fall was prevented.

At some distance from the coast the snow became, however, very soft, and bad for pulling, and our difficulties went on increasing, the snow became looser, and the pulling was very hard work, even if we had not had a continuous snowstorm blowing against us. I hoped that it would soon become better, but each day it became worse. It was only too clear

that if it continued in this way we should not be able to reach Disco Bay till the middle of September, when the last ship would be leaving for Europe. We should thus have no hope of returning home this year (1888) if we continued our way to Christianshaab. We should probably have a better chance of reaching a ship at Godthaab, situated further to the south, on the west coast; and as I thought this direction to be of more scientific interest, I changed our route and turned towards Godthaab, though I expected to find more troublesome ice in this direction, and though it would be much more difficult to reach the Danish settlements for rescue after leaving the inland ice. That was on the 27th of August. We had then reached about $64^{\circ} 50' N.$, about 40 miles from the coast, and a height of about 7000 feet. By this change of direction the wind became so favourable that we could use sails on the sledges, and thus they became less heavy to pull. In this manner we advanced during three days, then the wind went down, and we were obliged to lower our sails.

In the beginning of September we reached a quite flat and extensive plateau, which resembled a frozen ocean. Its height was between 8000 and 9000 feet, though towards the north it seemed to be considerably higher. Over this plateau or highland we travelled more than two weeks. The cold was considerable. I am not, however, able to give an exact statement of the temperature, as our thermometers did not go low enough. I believe that on some nights it was between -45° and -50° Centigrade (between 80° and 90° below freezing-point, Fahrenheit). In the tent where we (six men) slept, and where we cooked our tea and chocolate, it was even less than -40° Centigrade (72° of frost, Fahrenheit). During one month we found no water. To get drinking water we were obliged to melt snow either in our cooking apparatus or by our own warmth in iron bottles, which were carried inside our clothes on our bosoms. The sunshine on these white snow-fields was bad for the eyes, but no case of snow-blindness occurred.

To give a description of the scenery during the day in this region is easy. We saw only three things: that was snow, sun, and ourselves. One day was quite like another. But still even this part of the earth has its beauties, and I shall never forget the glorious sunsets and the nights on the snow- and ice-fields of Greenland, when the ever changing northern lights were scintillating perhaps brighter than anywhere else. I shall never forget the strange impressions, as from another world, we got in this solemn, silent nature, as we saw the lights spreading like a terrible fire over the whole sky, then gathering again in the zenith, as if swept together by a storm, always flitting, burning, and scintillating, and then at once disappearing, leaving the monotonous snow-fields in darkness as they were before.

Another more soothing and peaceful impression came upon us when the moon appeared and made its silvery way over the limitless snow-

fields over which the stars were sparkling with a brightness unknown in other latitudes; indeed I am certain that none of us will ever forget our night wanderings over the snow-fields of Greenland.

The landscape was not always, however, so peaceful as here described, sometimes we met snowstorms, and we often saw nothing but drifting snow. One day, the 8th of September, we were even obliged to remain in our tent, whilst it was nearly torn to pieces by the storm; the next day, when we wanted to continue our journey, we found that the tent was almost quite buried in the snow. We had to dig ourselves out and hunt for our sledges, which had quite disappeared; this, however, was very often the case in the mornings.

As to our daily life in these not very hospitable surroundings, with a temperature of 70° to 90° below the freezing-point Fahr., I shall not tire you with a particular description of that. I shall only say that we stood it pretty well.

The worst thing was to turn out in the morning. It sometimes happened that I found my head in the sleeping bag surrounded by a crust of ice and rime caused by the freezing of the breath. To turn out an hour before the others to cook, and be obliged to touch iron articles and get spirits of wine on your fingers, was not very agreeable. I had this pleasant work every morning, as the others, when they tried it, generally used too much fuel, and we had to be careful in that respect, as we should not be able to get any water without fuel.

As to cleanliness, we could not afford to indulge much in that luxury. I am afraid you may consider me a thorough barbarian when I tell you that we did not wash ourselves from the time we left the ship *Jason* until we reached the west coast, that is during two months and a half, and in the same time we were never out of our clothes. That we did not wash had, however, its peculiar reasons: on one hand we had no water; but, on the other hand, even when we had it, washing was strictly forbidden, as the washing of the face is very bad on snow-fields, where the sun is constantly shining, the skin is easily blistered, and the sun can cause you dreadful pains.

Our cooking was not always of the tidiest character, we had no water to wash our cooking vessel, and when we had cooked pea-soup in the night, we had to cook tea or chocolate in the same vessel next morning, with the remains of pea-soup in it. It was, however, rather good, as we could not afford to throw away anything belonging to food, neither were we very particular about what we got to eat. I remember one night our cooking apparatus was upset, and all our precious pea-soup was poured out over the canvas floor of our tent, but we did not hesitate; we immediately took hold of each side of the floor, lifted it up, and sucked the pea-soup out of the middle. No drop was lost. We were compelled, in fact, to live like natives. Mashers, I fear, would not succeed in the interior of Greenland.

On the 19th of September we got a favourable sailing wind, so that we could use sails on our sledges. We had only to stand on our *ski* and hold on to our sledges, while we rattled down the slope towards the west coast, sometimes with a quite astonishing speed. Certainly that was the most delightful ski race I ever had in my life.

Towards night, when it was getting dark, and when we just went on with a good speed, I observed a dark spot in front of us. I did not understand what it was, and let it go ahead. At a distance of some few steps I discovered, however, that it was a broad crevasse; the sledges were immediately turned just at the right moment, we were already on the margin of the crevasse, a second longer and the three first of us with two sledges would have disappeared, and none would have heard of us any more.

We had to be more vigilant after this. The night came, but we would use the favourable wind as long as possible, and as we got moonlight we could sail on for a very long time. I went in front examining the ice, and the sledges came sailing afterwards. We had to pass many crevasses, but no accidents happened. Once, however, a snow-bridge over a very deep and broad crevasse fell down just when we had passed, and had very nearly taken with it two men and two sledges. In the middle of the night we were at last stopped by ice so filled with crevasses that we could not advance any longer, and we had to pitch our tent and go to sleep. We were now very near the coast, but met with ice so difficult and uneven and filled in all directions with immense crevasses, so that we could advance only very slowly. At last, on the 24th of September, we reached land at a small lake to the south of Kangersunek, a fjord where a large glacier issues.

On the 26th of September we reached the sea at the inner end of the Ameralikfjord, in $64^{\circ} 12'$ N. lat. I shall never forget what a pleasure and enjoyment it was to get water again, so that we could drink as we liked—no wine could have tasted better, and what a comfort it was to have any quantity of fuel—willow and heather—so that we could make an open fire in the night and cook as much as we liked.

We had now reached our destination—the west coast of Greenland. The distance we had passed over the inland ice was about 260 miles. The interior of Greenland was explored at all events in one direction, in spite of the general opinion that it was impossible to accomplish it. We had now only one thing left, and that was to get into communication with other human beings. This it was desirable to do as soon as possible, as we had not very much food left—we had plenty of dried beef, but we suffered from want of fat; but Godthaab, the nearest place where people lived, was still a distance of 50 miles away. As I saw that it would be no easy task to reach this place by land, the mountains being too difficult to pass, I thought it better to go by sea,

and determined to construct a boat. The next day three of us made the boat out of the canvas which formed the tent floor, of the bamboo rods used on the sledges, and willow boughs found near the shore. Towards night our boat was ready.

Next day, September 28th, Captain Sverdrup and I started with this boat for Godthaab. The first portion of the way we had to carry it, as the fjord is filled with glacier mud. This was a rather heavy task, as we often sank into the mud to the knees. Next day we reached open water and went out of the Ameralik-fjord. During some days we got contrary wind, and the boat was very heavy to pull against wind and sea, it being too broad as well as short. On the 3rd of October we reached Godthaab and were heartily welcomed by the population. Two boats were sent to bring the other four members of the expedition to Godthaab. Being stopped by a heavy storm, these boats were, however, obliged to wait for several days. At last, on the 12th of October, they arrived, and all our party were gathered in Godthaab. The expedition was finished, and Greenland was crossed for the first time.

My hope to find a ship for Europe in Godthaab was disappointed. I, however, learned that at Ivigtut, about 240 miles south of Godthaab, there was still a ship, the *Fox*, which in the middle of October was to leave for Denmark. I sent immediately a messenger (an Eskimo in his small skin-boat or *kajak*) to the *Fox* to ask the captain to come and take us home. As the season was very late and as the captain of the *Fox* did not know how much ice there was towards Godthaab, he dared not come, and we were obliged to spend the winter in Greenland. Strange to say, this ship, the *Fox*, which brought the message to Europe that we were safely arrived at the west coast of Greenland, is the same ship which Sir Leopold M'Clintock commanded on his famous expedition in search of Franklin.

To spend a winter in Greenland was not very disagreeable to us. We had a pleasant time of it; there was plenty of shooting, sea birds, ptarmigans, and reindeer; there was snow enough to enable us to use our *skis*. But the most fascinating of all was the life in the *kajak*, or small Eskimo skin-boat, only capable of holding one man, which certainly has not its equal, and is the best one-man vessel in the world. It is propelled by a paddle, and when you have learnt to manage it properly, you may go against the heaviest storm. If you are capsized by a sea and can manage your oar, you can rise again and need not be afraid of anything. A good Eskimo can, in his *kajak*, go even 80 miles in one day.

For one who cannot manage his *kajak* easily it is rather a dangerous sport, and many Eskimos die in the *kajak* every year; in Godthaab and neighbourhood six died this winter, but that is one of the reasons, perhaps, why *kajak* sailing is so fascinating.

On the 15th of April this year the Danish steamship *Hvidbjørnen*

came to bring us home, and we left Greenland almost sorry to part with its happy people, these children of nature, who have no experience of the miseries of civilisation, and who do not know real poverty. Sometimes they are in want, but generally they have plenty of food and are always happy and content.

The voyage homewards was as pleasant as possible.

The scientific results of the expedition cannot at present be stated, the many observations not having been worked out by the special *savants* to whom they have been submitted. There are, however, some points which, especially in geological and meteorological respects, even at present are prominent; and though I am no geologist and no meteorologist, I shall mention some of those which according to my view are of much interest.

At first I think the shape of the inland ice is of importance.

Many geologists have suggested that the interior of Greenland is ice- and snow-clad, but there have been others who were of the opinion that it was not snow-clad. Amongst the latter I will here especially mention the famous Nordenskiöld.

This prominent explorer of Arctic regions, who has seen more of ice- and snow-fields than most people, held the opinion that we are not entitled to conclude that the ice-covering extends throughout Greenland from coast to coast, notwithstanding that nobody had seen the boundaries of the "ice-desert." He even believed "that it in most cases is a physical impossibility, that the interior of a large continent should be completely covered with ice under the climatic circumstances which occur on our planet south of 80° latitude." As to the interior of Greenland, he says that it is even easy to prove that the conditions for the forming of glaciers cannot occur there if the surface of the land does not gradually and regularly rise from the east coast as well as from the west coast towards the centre. But such a shape has in Nordenskiöld's opinion no continent, orographically known, on our earth. Greenland he supposes to have an orographical construction very much like Scandinavia, that is, it consists of mountain ranges and peaks separated by deep valleys and plains, and in such a country most of the rain and snow must fall in the neighbourhood of the coasts, whilst only dry and warm winds reach the interior, so that there cannot be moisture enough to form a glacier here.

I will not here criticise Nordenskiöld's theories. The expedition from which I have just returned has, in my opinion, fully proved that they cannot be right as far as concerns Greenland. It has, I believe settled the fact that this part of Greenland is not only ice- and snow-clad, but has a mighty shield-shaped covering of snow and ice, under which mountains as well as valleys have quite disappeared, and where you cannot even trace the configuration of the land and mountains. Whether this is also the case in the most northern parts of

Greenland I dare not yet say; this must be decided by a new expedition, and I think the question to be of the highest interest. At present we will only consider the southern parts of Greenland.

The ice-covering has here, as already mentioned, the shape of a shield. Rather rapidly, but regularly, it rises from the east coast, reaches a height of 9000 to 10,000 feet, is rather flat and even in the middle, and falls again regularly towards the west coast. Considering this peculiar and regular shape of the ice, the first question which must force itself upon us is, What has occasioned this regular shape? what is the configuration of the land underneath?

I have heard geologists say that, judging from what has been observed by us, it is clear that Greenland is a tableland, the exterior parts of which are only excavated by the glaciers, so that fjords and valleys are formed, whilst the interior evidently has the shape of a high plateau, where no considerable valleys or mountains can be present, here being no glaciers to excavate the ground. But I think this conclusion is entirely false. I think that the shape of the surface of the inland ice is not at all caused by the configuration of the land underneath.

Nordenskiöld is certainly right when he says that the configuration of Greenland is very like that of Scandinavia, and especially that of Norway, and let us also say that of Scotland.

In the interior of Greenland there must be mountains and valleys, as well as near the coast. That there are on the coasts deep fjords and lofty mountains very like those of western Norway, and that they have just the same wild and prominent character in some places, we already know; they are perhaps even wilder than I ever saw them in my own country.

If we entertain the opinion that these fjords are excavated by the ice, we must also conclude that the same ice has been able to excavate valleys and form mountains in the interior of the continent; to this subject I shall, however, return a little later. At present I will only state that we have no right to seek the reason of the shield-like shape of the ice in the configuration of the land underneath; the surface of the ice must have a shape of its own, which is given not by the land but by the meteorological circumstances. Nobody can deny that the ice must in some places have a quite enormous thickness, as it fills the valleys and covers up all the mountains, and its thickness must evidently be regulated by the quantity of snow falling. This quantity must be largest towards the coasts, gradually diminishing towards the interior, it is consequently very likely that the ice has not its greatest thickness just in the middle of the continent, but rather on both sides towards the coasts. We might thus already *a priori* have expected to find a shape of the ice just like that observed.

I have already mentioned that the surface of the snow-field in the interior is quite even and as it were polished. It has a striking

resemblance to the undisturbed surface of a frozen ocean, the long but not high billows of which rolling from east to west are not easily distinguishable to the eye.

The principal factor which makes this surface so remarkably even is the wind. The levelling influence of the wind may easily be studied in our own mountains in the winter; there it may be seen how its prevailing effect is to remove every prominence, the snow being carried from the mountains into the valleys to fill them and make the mountains disappear.

This has of course also been the case in Greenland, only to a much higher degree, when its present glacial period commenced. The snow grew annually, gradually the valleys were filled up, the mountains disappeared, and the snow-field was produced which we now see. The work of the wind now is to level and polish the surface of this vast field and make it as smooth as the surface of a lake in quiet weather, where you find no spot to fix the eye upon or where you can let it rest; where you have to use your compass just like you do at sea.

The surface of the snow-field in the interior consists of soft, loose and dry snow, which is easily moved by the wind. Even in midsummer there is no snow-melting of importance in this interior. Even with the six feet long sticks we use for *ski*-running, I could not reach hard ice or snow underneath the soft layer. At intervals of six to ten inches quite thin ice-crusts occurred, between them there was, however, soft snow like that of the surface. These thin ice-crusts are evidently formed by the direct influence of the sun during midsummer. The sun is then in the middle of the day able to bring the surface of the snow to melt a little; in the night, however, it freezes again. Whether these ice-crusts at certain intervals indicated annual layers of snow, or whether they only indicated heavy snowfalls during the summer, I am not able to decide; I am, however, inclined to be of the latter opinion, at all events to some extent.

I previously mentioned that we had snowfall almost every day; when we compare this with the just stated fact that there is no real snow-melting in the interior, it would seem as if we were obliged to conclude that the quantity of snow is still increasing in the interior of Greenland. This cannot, however, easily be the case, at all events, not in any considerable degree, for if it was so, the quantity of ice and snow must also increase towards the coasts.

Judging from the observations and measurements which during several years are made on the west coast of Greenland, it seems, however, as if the ice varies a little from one year to another, but that upon the whole its quantity keeps very nearly on the same level. We are not thus entitled to assume that the quantity of snow is increasing in the interior.

But what is the reason why it does not increase?

As already mentioned, the snow-melting cannot be of any importance. The evaporation from the snow-surface cannot, in my opinion, be of much more importance, as it must be quite a trifle with such a low temperature of the air, and where on most days a little snow falls.

A factor of more importance is, I think, the snowdrifts occasioned by the wind, which most likely has a tendency to blow from the cold and high interior towards the lower and warmer coasts. In the middle of the continent the winds blow, however, in all possible directions, and thus I think even this factor is of no great importance. The principal factor to keep the level must in my opinion be the pressure which is produced within this immense layer of ice and snow. On one hand this pressure forces the ice downwards along the sloping sides of the mountains, through the valleys and towards the sea, into which it falls in form of ice-streams or glaciers, and is carried away in form of icebergs or is melted.

To a great many people it does not seem necessary that the ice must force its way to the coast in this manner, but I think that if we said that the interior of Greenland was filled or covered by an immense layer of pitch nobody would doubt that this would find its way to the sea; but there is really in that respect no great difference between these two materials; by the immense pressure the ice is probably made even more fluid than melting pitch.

But the pressure brings the ice to the sea not only in the form of ice, but also, and certainly in larger quantity, in the form of water. As is generally known, ice has the peculiarity that by pressure it can be transformed into water at temperatures lower than its common melting-point—in other words, pressure lowers the melting-point of the ice. I do not think, however, that it is principally in this manner the pressure contributes to the melting of the snow, as such a high pressure and consequently a very considerable quantity of snow and ice is necessary to lower the melting-point of the ice only one degree. I think that the most important factor is the warmth produced by the pressure and friction. When such immense quantities of ice and snow as those in Greenland are in constant movement, it is evident that the pressure must give rise to a quite enormous friction, and in this way a considerable warmth must be produced. There is thus much reason to conclude that the deeper we come in the ice the higher temperature we will find, and at a certain depth the temperature of the ice must be about its melting-point, which consequently is somewhat lower than the ordinary freezing-point (i. e. zero of Centigrade).

Even if we do not think of the fact that the temperature of the earth's crust rises everywhere when we penetrate towards the depth, it seems thus to be likely that in the depths of the inland ice of Greenland, especially where the ice touches the ground underneath, there is a considerable melting going on. It may be objected that nobody has

observed this melting or even a rising of the temperature of the ice downwards. This is quite true, but a good proof that a melting really goes on in the interior are the rivers, which, even in the middle of the cold Greenland winter, run out under the glaciers at the margin of the inland ice. I have observed such rivers myself; they were even large where there was no possibility of a melting on the surface of the inland ice.

For glacialists I think the observations made on this expedition must be of great interest. I think they must contribute largely to confirm many of the glacial theories.

The careful observation of a snow and ice covering like that of Greenland is, in my opinion, of great importance for the theory of the formation of valleys and fjords by the ice. The ability to excavate the ground underneath must be considerable in quantities of ice like those observed there. To me it seems indeed natural that the more we study Greenland, its coasts, and its inland ice, the more convinced must we feel of the great ability of the ice to form fjords and valleys to a great extent. Indeed, if we attentively study on one hand the fjords and valleys of Greenland, with their many evidences of glacial influence, and on the other hand the inland ice, we can be in no doubt whatever that these are in a near relation to each other; and if we from Greenland turn our eyes to Norway and Scotland, we must grant that there are here quite similar formations.

In meteorological respects there are some observations of great interest. The very low temperature met with in the interior will be astonishing to most meteorologists; it does not seem to agree with the received meteorological laws, at all events not at the first glance. The radiation of warmth from this immense snow-field, in such an altitude where the air is consequently very thin, must evidently have a great influence in lowering the temperature. The interior of Greenland must indeed be the coldest place on earth hitherto known; it must be a kind of cold pole from which the winds blow towards the coasts and the sea.

I think that this low temperature may throw a good deal of light on the much discussed question, the cause of the great cold of the Glacial Period in Europe and North America, which at that time were covered with an ice-sheet similar to that we now see in Greenland. I think that the best way of solving the problems of the great Ice Age is to go and examine the places where similar conditions are now found, and no better place can be found than Greenland. But Greenland is a vast region; our expedition was the first to cross it, but I hope it will not be the last.

The following discussion ensued on the reading of the foregoing paper:—

Sir LEOPOLD M'CLINTOCK expressed his admiration of the feat which Dr. Nansen had performed. For a very long time he (Sir Leopold) had devoted much attention to the improvement of sledge equipments. In exploring a new country, of course, a

baggage wagon was a most important article, and in Arctic regions the sledge was the baggage wagon. It should be strong but light, because the baggage animals were the men. Sledges might be divided into two classes—the flat sledge and the runner sledge. The flat one was an extremely thin plank, 12 feet long, turned up at the fore-end. Where the snow was very soft and deep no other could be used. In the runner sledge the platform, on which the baggage was secured, was raised a few inches on runners or skates. These runner sledges were used in the English Arctic expeditions, and with them about 40,000 miles had been travelled in the search for the Franklin Expedition. In Greenland the runner sledge was used almost exclusively. Where the depth of snow was not great the runners cut down through it on to the ice. The sledge Dr. Nansen had used was a combination of the two kinds. It was, strictly speaking, a runner sledge, but the runners were simply enlarged Norwegian snowshoes, and were admirably adapted to the nature of the surface travelled over by his expedition. Next in point of importance to the sledge were the Norwegian snowshoes, 8 feet long and 3½ inches wide. In the Franklin searching expeditions they were not unknown, but the circumstances were not favourable for their use; the snow was seldom deep enough or smooth enough. On one occasion he thought the time had arrived when he might achieve a triumph. There had been a fall of snow, and a beautiful little white fox came near; so he started off in snowshoes to catch him, but after a few miles he was convinced there was no chance of doing so, as he was not a born Norwegian and familiar in the use of them. Dr. Nansen had given them a graphic description of his ice navigation; but he dwelt sufficiently upon the remarkably low temperature, and had barely mentioned the intense snow-glare. For six or seven weeks not a speck of black was to be seen anywhere. Nothing could be more trying to the eyes. Of course they wore smoke-coloured glasses and veils, and Dr. Nansen found, contrary to English experience, that red veils were more efficacious than blue or green ones. None but those trained to snowshoes could have performed such a feat as Dr. Nansen had done, for he found the snow to be uniformly soft and deep. After crossing Greenland Dr. Nansen had to construct a boat, without any other means than his own equipment afforded; out of his sledges he formed a framework and covered it with the canvas of his tent, and in this frail structure this worthy descendant of the hardy Norsemen sailed some fifty miles; this is a most remarkable instance of resource and power of adaptation in overcoming difficulty. Every one could appreciate his heroic determination at the outset, to leave himself no retreat. Other leaders who had burned their boats behind them had an inhabitable country before them; but Dr. Nansen had only a glacier before him and he depended solely on what he carried on the sledges. He started with sixty days' provisions, and he was between seventy and eighty days in crossing the glacier. Greenland was 1400 miles in length, and therefore crossing it only in one place did not satisfy the requirements of science; its eastern coast was almost unknown, it was even uncertain whether any human beings existed there; in the year 1826 a few Esquimaux were met with by an English expedition, but none have been seen by any subsequent visitors. He hoped that on a future occasion Dr. Nansen would not be unwilling to pay another visit to Greenland, and if he did, he would be sure of receiving a hearty welcome from this Society, on his return.

Sir ALLEN YOUNG indorsed Sir Leopold M'Clintock's opinion as to Dr. Nansen's wonderful performance. In 1860 he commanded the *Fox*, the very ship that Dr. Nansen had mentioned, on an expedition intended to survey a route by way of the Faroe Islands, Iceland, and Greenland to Labrador. He was accompanied by Dr. Rae, who crossed the Faroe Islands and Iceland, and surveyed the routes for the telegraph. On September 12th, after passing through 100 miles of ice, they arrived at the coast of

Greenland, about 63° N. The sight of the coast was simply appalling, with precipitous peaks and cliffs, and glaciers running down to the sea. He was about one mile off the land, and could have landed a party; but feeling that he could not keep his ship in her position, he thought it better to report in favour of carrying a cable round the south into one of the western fiords. Afterwards, on the western inland ice, he accompanied Dr. Rae for two days, but heavy snow intervened, and he had great difficulty in getting back to his ship. That was in the middle of November. He wished to ask Dr. Nansen if he thought it would be possible to land a telegraph cable on the east coast and carry it across to the west coast.

Dr. RAE begged to express his admiration, and to re-echo the words of previous speakers, at the manner in which Dr. Nansen had carried out the arduous work he had undertaken in the crossing over Greenland, although, owing to unforeseen detention, the crossing was not made in a locality so far north, or at so wide a part as he had hoped to do. But he evidently, and for obvious good reasons, started from the right side (the east). Dr. Nansen's sledges were evidently superior in many ways to those used by the great English Government Arctic expeditions, the runners of the former being proportionally much broader, and therefore having a much greater bearing-up power, in proportion to the lading, than the latter, which the sailors (who hauled them) said buried themselves in the deep, soft snow lying between the ice hummocks, giving immense trouble and labour in extricating them; whereas the flat sledges in the form of the Indian "toboggan," with runners five-eighths of an inch deep, used by his (Dr. Rae's) parties, could not sink in the snow, and when having run down one hummock, it by its own impetus went half-way up the next. With these sledges, heavily laden, each man hauling one, some journeys of over 1000 miles were performed at a daily rate of 20 miles; and that of 1851, aided by three half-starved dogs, at the rate of 25 miles, the leader of the party hauling a sledge lightly loaded with 60 lbs. Regarding the *Fox* Telegraph Expedition, of which Sir Allen Young spoke, and of the overland part of the work, of which he (Dr. Rae) had been placed in charge by Colonel Schaffner, the crossing of Greenland, although it was talked of, there was not the slightest intention of its being attempted, not the smallest preparation of any kind having been made for such an arduous piece of work; and if there had been any such preparation, the lateness of the season (November) would have been a fatal hindrance. All that was desired or expected to be done was accomplished by getting a few miles inland on the glacier, and by reaching a deep and wide crevasse that effectually stopped further progress; and showing that to bring a telegraph wire across the ice would be very difficult, if not impracticable, and in his (Dr. Rae's) opinion useless. Moreover, by some curious mistake, the provisions for the four Eskimo women that formed the crew of the boat (only one sailor could be obtained from the *Fox*) had not been put on board, so that during the detention of the party by a severe and long snowstorm, they would have been on very short commons, but for there being a good many ptarmigan, of which a number were shot by the leader of the party, owing to which he acquired the character of being a very expert sportsman indeed, because the crew saw these fine birds shot down two or three at a time (pot-hunting with limited ammunition) with a double-barrel and small shot, whilst the Eskimo hunter had to use a very inferior rifle and single ball for the same purpose. The party, as soon as travelling was possible, went to an Eskimo's house (built of wood) at the north side of the fjord, where they stayed until the ice became strong enough to be walked upon, and men with a boat were sent from the *Fox* to assist them. From this Eskimo a very fine sheep was bought, which produced an excellent mutton as could have been got in London, and full rations were served out to all. On arriving at Julianshaab a ball took place, at which Dr. Rae was courteously

invited to dance a polka with each of his dusky but blithe boat's crew, and the little lasses performed extremely well.

Admiral Sir E. OMMANNEY hailed with joy the presence of Dr. Nansen at this Society, the first man that ever crossed the continent of Greenland from sea to sea. In traversing the White Continent he had performed as glorious a feat as the man who had walked across the dark continent of Africa. He did not know which to admire most, the courage which Dr. Nansen had shown when cast adrift with his party on the loose floes of ice, drifting about at the mercy of the currents and winds, in hourly peril of destruction, or the fortitude which he exhibited during his remarkable march across the elevated icy plateau of Greenland. Of naval Arctic explorers, he (Sir Erasmus) had now become a veteran, for he had served under Captain James Ross, in 1836, on an expedition to Baffin's Bay, and had landed at several points on the West Coast of Greenland. He then wondered whether it could be possible for any human being to traverse the interior ice of that glacial country, and he was happy in having lived to see the man who had accomplished the feat, which must stand on record as one of the grandest achievements in the history of Arctic travel and discovery. The mode of travelling and sufferings experienced by Dr. Nansen were in some degree similar to what were encountered on the sledge journeys during the search after Franklin's ships. The audience would therefore form some idea of the noble work which our gallant seamen performed in sledging over many thousand miles of ice in pursuit of that ill-fated expedition. It was important to point out an exceptional feature in this very remarkable journey as compared with previous Arctic explorations. Dr. Nansen's track lay far south of the Arctic circle, and he travelled late in the season, consequently he had to contend with the inconvenience of some darkness during the twenty-four hours, and suffered an intensity of cold quite unprecedented; whereas the English sledge journeys had to be performed in a far higher latitude under continuous daylight, having the sun always above the horizon. In congratulating Dr. Nansen on his great success, he (Sir Erasmus) would desire to see him attempt the exploration of the Antarctic regions, where a far more glorious field for research was open to his power and skill than he could find in the Arctic.

Dr. NANSEN heartily thanked the speakers for the flattering words which they had used with regard to him. He thought it quite impossible to carry a telegraphic cable across Greenland and keep it there, on account of the movement of the glaciers. No place would be found in which to fix the poles, and it could never be certain that the cable would not be broken. He agreed with Sir Allen Young that it was better to carry the cable along the coast to Cape Farewell, and then across to Labrador.

The PRESIDENT tendered in the name of the Society their most cordial thanks to Dr. Nansen for the very interesting paper with which he had favoured them. It was the record of a most extraordinary achievement, boldly planned, resolutely undertaken, and most skilfully carried into effect. At the age of twenty-seven to have taken a foremost place amongst northern travellers, was to have done enough for fame, but he was sure that Dr. Nansen's energy would be stimulated by what he had already done, and the reception which he had met with that night would only be the first of many recognitions of good work done. It was in the fitness of things that this most interesting expedition should have been carried out by the subjects of that accomplished and able monarch, who so wisely and well governed the two northern Scandinavian countries, and by the presence of whose much respected representative the present meeting was honoured. But he was convinced that it must have been very agreeable to Dr. Nansen that Denmark shared in the honour. A well-known and public-spirited Danish merchant, Mr. Gamel, found the principal part of the funds

that were required for the expedition. If he were not misinformed, Dr. Nansen, although a Norwegian, had Danish blood, and in his remarkable enterprise he was only emulating in peace the spirit which had been manifested by his kindred in war. One of Dr. Nansen's Danish connections was a hero of Danish naval story. A hundred and eighty years ago the relations between Sweden and Denmark were not altogether so pleasant as they now were, and in the year 1709 a sea-fight took place between them, in the course of which the vessel commanded by a connection of Dr. Nansen, Captain Hvitfeldt, took fire. She was to windward of the Danish fleet, and he saw that there was imminent danger that she might be driven against the other vessels. He took his resolution, and calmly blew up his vessel, thereby sacrificing himself, but saving his friends. Not a little of Captain Hvitfeldt's energy and self-sacrifice seemed to have passed into the veins of his descendant. In conclusion, he wished all prosperity to Dr. Nansen, and to all who took part in the expedition.

Dr. NANSEN returned his most cordial thanks for the words which the President had spoken, and for the welcome which he had received from the Society.

*The Local Distribution of the Tribes inhabiting the Mountains
of North-west Morocco.*

By WALTER B. HARRIS.

Map, p. 524.

So little is known of the fanatical tribes of the north-west mountains of Morocco, that a few facts I was able to gather during a visit to their country in March and April of this year (1889) may not prove useless.

I had returned from Fez by the "upper" road to Wazan, but was unable to stay more than two days there, owing to some of our party—having been detained by the rainfall of early February—being pressed for time. However, short as was my visit then, it enabled me to renew my acquaintance with H.H. Mulai Mohammed—Sherif of Wazan—who pressed me very much to return on a visit to him as soon as I was able after my arrival in Tangier. Ten days after arriving there I set out once more "up country," accompanied by only three Moors, one the Selim who led me to Sheshuan last year, the other two men I knew well and could trust.

Much rain fell during my journey, and I did not reach Wazan till six days after my departure, in spite of rather stiff travelling. I was cordially received by H.H. as usual, and given a house to live in and all my wants supplied during my whole stay of one day less than a fortnight.

My journey to Sheshuan last year had immensely interested me in this portion of Morocco, and its inhabitants. So I determined to take advantage of my stay at Wazan in finding out as much as I possibly could about the tribes situated to the east of that town, and inhabiting a district stretching from Tetuan on the north to Fez on the south.

I had been enabled during former visits to this part of the country to satisfactorily determine the local distribution of some of these tribes, and great was my delight to find my half-sketched map—full, however, of large blanks—coincided with what I learnt at Wazan as to their respective positions.

Before asking any questions from the natives of Wazan, I spoke to Mulai Mohammed on the subject, and not only did he himself give me great help in localising the mountaineers, but where his knowledge failed, inquired himself for me from his servants and the Wazan people. It is owing to this that I feel confident that my map—the first I believe to attempt to place the mountain tribes—is correct.

On my arrival at Wazan the tribes I had already been able to locate were those whose country I had passed through between the Fondak on the Tetuan road, along the steep slopes of Jebel Habib to Alcazar. Though nearly all Shorfa* in this part, I found them hospitable and pleasant, and the road is one easily, though very seldom, travelled over.

These tribes were Al Fahs, Beni M'Sor, Wad Dras, Beni Dir, and Beni Arros. Al Fahs is not, properly speaking, a mountain tribe, as it includes the country round Tangier. It is a large and influential district. The three next, Beni M'sor, Wad Dras, and Beni Dir, are mountain tribes of no great importance or size. Beni Arros, however, contains several small cities on the higher mountains, which I was not able to visit. The mountains of all are well wooded with wild olive and cork trees. These tribes, or rather their country, is clearly visible the whole road from Tangier to Alcazar. A visit to the Anjera in the spring of last year allowed me clearly to discover the boundary of that district, as far as any of these tribes can be said to have a boundary, and Anjera can be said to extend from a short way to the east of Tangier as far as Ceuta and Tetuan, but all the while to the north of the Tetuan road.

In July 1888 my ride to Sheshuan enabled me to place upon my map the positions of the Beni Hamar, Beni Hassan, Ghamara, Riff, Beni Ghorfad, Sheshuan, and Lakhamis tribes, through all of which, with the exception of the Ghamara, Riff, and Beni Ghorfad, I had to pass. All these tribes are of importance, the Beni Hassan sharing with the Beni M'Sara, further south, the reputation of being the most powerful of all. Sheshuan is by far the largest town in any of the mountain tribes, but as it was described in my paper to the 'Proceedings' of January of this year, I need not further describe it here. Most of these latter tribes are marked on De Foucauld's map. Ghamara is a province that takes its title from the river of the same name. The Riff beyond is a Berber tribe and stretches away for miles toward the coasts of Oran. The people only to a very slight extent understand or speak Arabic, Shleh

* Descendants of the Prophet Mohammed.

or Shluh being their native tongue. The great difficulty against exploration in the Riff is the treachery of its inhabitants, who are said to be perfectly untrustworthy and therefore most unlike the Arab mountain tribes, who, when once they have said "Mahababec," (you are welcome), will die in one's defence.

My journey from Fez, and inquiries I made there, sufficed for me to localise the tribes of Beni M'Tir, Beni M'Gild (both Berber) while at Mequinez, and on the road from there to Rabat, I was able to visit the Zarun, round which I made a complete circle, and the Zimmuri; the latter a very short and quite unintentional visit that was put a stop to by three sturdy warriors, who covered us with their guns till we retired.

In the Zarun are two interesting places, neither of which I have entered: first the sacred town of Mulai Idris, magnificently situated on the crest of a precipice, and a most holy sanctuary. It is a large and important town. The other place is Mulai Yakub, famed through all Morocco for the healing powers of its hot springs, and certainly marvellous cures are accomplished.

In the Zarun too are the remains of Volubilis, an ancient Roman city, close to Mulai Idris, called by the Moors "Kasr-al-Farun," or Pharaoh's castle. Two arches and some columns still remain in good preservation. There is not the slightest difficulty in visiting the place, as it is situated on one of the high roads between Alcazar and Mequinez, and only some three hours' ride from the latter city.

My journey from Fez to Wazan this year was by a road previously untrodden by myself, though one not uncommonly taken by other travellers and sportsmen. After passing along this road I was able to place three new tribes upon my map: first, to our right (east), after leaving Fez, the Beni M'gilda; secondly, the Beni Zarun, the mountain tops of which were clearly visible; and thirdly, the large and important tribe of Beni M'sara. All three lie to the east of the road. There is nothing of great interest between Fez and Wazan that I was able to see. The "Haja-al-uerkof" is a curious pile of rocks, situated to the north-east of the ford of the Ouergha, the largest tributary of the Sebu. The next day after passing these stones we crossed the Sebu itself by a deep ford.

I was not able to visit the Zarun, but I have heard from many hillsmen a story concerning one mountain, which, together with what I have lately seen in the Ghruneh, leads me to believe that a small active volcano exists there. There is a long fable connected with the place, not worth repeating here, but I have heard over and over again, from very different and trustworthy sources, that there is a mountain in Beni Zarun containing a circular hole (i.e. crater), where by day smoke rises, and by night fire is clearly visible.

Distinct volcanic remains I have lately discovered to exist in Ghruneh, and the distance between the two being so little, leads me to feel almost

certain that in this volcanic district, fire at least does come to the surface. I have made many friends in the mountains now, and can travel easily in Ghruneh and Beni M'sara, where Christians as a rule are not allowed to enter, and hope before long to return there to try and discover for certain the existence of a volcano.

During my visit to Wazan I visited Ghruneh, Zua, Beni Isaf, and the Beni M'sara, also the minute tribe of Estab, where too are clear remains of extinct volcanic action.

Though I visited these tribes in search of sport, I did not keep my eyes shut. I entered first the Beni M'sara, visiting their large village of Ain Zorah, where are some ruins of an ancient palace and a fine garden belonging to H.H. the Sherif. Pushing on beyond this village, I was able in one day to visit two more large villages, returning to Wazan the same night after a ride of nearly eleven hours over rough ground. I was accompanied on this trip by some dozen horsemen of H.H.'s and a rabble on foot, who beat the bushes for hares and partridges. I was most cordially received by the tribesmen, and entered several of their houses, substantially built of tabbia and thatch. The houses are as a rule built round a square; one long room, a complete side of the house, being the reception room. The inhabitants are for the most part fair, with blue eyes and yellow beards, perfectly built and exceedingly handsome men. I asked during the course of "tea" why they had always prevented Christians entering the country. They responded that they feared Christians merely travelled in Morocco to spy out their land, and that some day they would arrive with a large army to take their country; but that any Christian who would come to their country with the credentials I possessed—an intimate friendship with Mulai Mohammed and some knowledge of their language—might enter with perfect safety, and not only enter but be very welcome.

I found all the people on my various visits most kind. They never asked me for money or for any of my possessions, and though licentious to a degree, regulate their conversation with great discretion. They seldom marry according to the law, but kidnap girls from the neighbouring tribes, who are dressed in velvets and silks, and covered with chains and bracelets, and who perform a "ballet" before the assembled peoples.

These girls are a matter of commerce, and fetch exceedingly large prices. They are treated with far greater respect than the other Moors treat their wives, and altogether have a very easy time of it, not being expected to work even in the houses. Curiously enough these girls uncover their faces before other Moors than their master, and even in bringing me tea made no attempt to hide their beauty, which was remarkable.

The kidnapping of girls often leads to trouble and to warfare between the different tribes, in which the women take part.

My next visit of any importance was to the Ghruneh, when Mulai Mohammed himself accompanied me. We first visited the high mountains to the south of their country, proceeding afterwards to Ajin, a large village (or small town) with a handsome mosque, where our camp was pitched. The village contains the tomb of a great Jewish saint, and here all the Jews who die in Wazan are buried, as none are allowed to defile the sacred soil of that town. Being with the Sherif I was most cordially received, though Ajin has the reputation of being a most fanatical town. I took advantage of being in such good company to make friends with the Kaid of the district, and owing to this was able shortly afterwards to pass to the other extremity of the Ghruneh tribe, not far from Sheshuan—perhaps half a day's journey. However, after my last experiences of that place I did not attempt to push on. I made several journeys into Ghruneh, during one of which I saw indications of Troglydyte caves not unlike those at Ain Tarsil, to the south of Morocco city, and those between Tetuan and Sheshuan.

Though easy to be reached, the mountaineers forbade my entering these caves, though it was very tempting to do so, as they told me that some Moors had once entered and found old stone weapons and pottery, but that *djins* (devils) had quickly driven them out. I did not attempt to enter, as all my success in pushing further into this unknown country depended on my following the advice of my mountaineer friends, and doing everything I could to please them.

The mountains all through are high, and covered for the most part with thick brushwood. Small game abounds, as do also boar, jackal, and foxes. Corn is grown in the valleys, and on the whole the mountaineers are the best-to-do tribes I have come across in all the country, as they pay no taxes. Lately the Sultan sent to demand payment of taxes from the Beni M'Sara. Their answer was very fine. "Tell that lord of yours" (*Sidcûm*), they said to the soldiers, "that if he wants our taxes he can come for them, and we will make sure he gets them, in silver coins too, for we will roll each peseta into a bullet, and deliver it to him ourselves." There is something grandly independent about these splendid fellows.

They dress, as do all the mountaineers of Morocco, in richly embroidered brown jelabas, or hooded cloaks, while round their heads they wear a scarlet cloth guncase "*à la*" turban. All carry guns and swords, or daggers, gaily painted wooden powder-flasks or brass powder-horns, attached by cords of leather embroidered in silks.

The visit to these tribes allowed me to fill in the blanks of my map, which I now offer to the public as, if not exactly correct (which I thoroughly believe it to be), yet the most correct as yet drawn up.

Explorations in the Region of the Upper Gascoyne and Ashburton Rivers, West Australia.

By ERNEST FAVENC.*

THE country traversed during this short trip is situated about 24° S. lat.; the region drained by the head waters of the Gascoyne and Ashburton rivers on the coast-fall, and the unnamed creeks and watercourses running into the interior of the continent on the eastern slope. At the present time pastoral settlement has extended to the head of the Murchison river, there being but one small outlying station on the Upper Gascoyne, and the Upper Ashburton is without settlement. My intention originally was to cross from the head of one of these rivers to a point on the overland telegraph line about the neighbourhood of Newcastle Waters, but circumstances of a private nature obliged me to forego this intention and content myself for the present with a shorter trip.

We left Champion Bay in March 1888, but as I had certain areas of pastoral country to examine and report on, the work of exploration did not commence until May 15th, when I left our camp on the Upper Gascoyne to cross on to the head of the Ashburton on the north. I had with me Mr. W. R. Cuthbertson, surveyor, and a West Australian native named Toby, leaving two men in camp until our return. This portion of the continent of Australia partakes of the monotonous character of the great plain of the interior. The forests are stunted and consist chiefly of thickets of mulga, the plains are but poorly grassed, the ridges and ranges excessively stony and invariably covered with the prickly grass known as spinifex. Necessarily the landscape is devoid of any beauty.

Our first night's camp was a shallow brackish pool on the main head of the Gascoyne. The next morning we followed this branch up, and at nightfall found ourselves at the foot of a bold bluff range, rugged and precipitous. In the morning we traced the course of the river for many miles without finding either water or sign of animal life. From the summit of a small hill at the highest point we reached, the view to the eastward afforded nothing but an expanse of low ranges, one mountain of some size being a conspicuous object. The absence of water compelled us to return some distance to a small rocky pool we had noticed the day before. The following day we made straight for the lowest gap we could see in the range, carrying on the pack-horses as large a supply of water as our canvas bags would hold.

After following up a rugged and dry watercourse, we reached the top of the range by a comparatively easy ascent, and found ourselves on

* Author of the 'History of Australian Exploration from 1788 to 1888' (Sydney, 1888). A reference to Mr. Favenc's previous journeys of exploration is given in 'Proceedings R.G.S.,' 1888, p. 743.—[Ed.]

a wide plateau sloping gradually to the north, scantily clothed with stunted shrubs and spinifex grass. Dark level-topped ranges lay in front of us, and we were evidently on the head of a river valley. By dark we had followed down a dry creek strewn with boulders, for some miles; and the country bearing every indication of continuing its rough and inhospitable character, we had to camp on the first clear patch we reached. The utter absence of feed or water for our horses compelled us to tie them to trees with halters to prevent them rambling away, and before daylight had fairly broken, we were once more in the saddle. The creek we were following soon assumed the proportions of a river, running through a valley bounded on each side by rude bluffs; its course was a fair north-westerly one; still it was quite dry and the country through which it took its course was a desert of the worst type. We were now anxiously looking out for any indications of water, as our horses had been without a drink since the morning before.

At noon we crossed a red sand ridge, and struck a dry creek coming from the east; following this down I noticed that some rushes on the bank looked green and fresh about the stems, so we dug a small hole in the creek and found the sand slightly damp. By going deeper, and enlarging the hole, we obtained a scanty supply of water, that sufficed to give our horses a much-needed drink. The process was very slow, and may be said to have occupied the whole of that afternoon and the following night, the water having to be baled out of the hole and poured into an impromptu trough, but it drained so slowly into our little well, that it took nearly two hours to collect sufficient to satisfy one horse.

On the 20th we still followed the dry river, which from its position and course we rightly judged to be the head of the Ashburton, until about the middle of the day, when a welcome change took place, but only for a short time. Crossing a low chain of hills we found that an abrupt transition occurred from a slate to a soft granite formation, the consequence being that at the foot of these hills extended small plains well grassed, leading us to hope that we were at last to emerge from the dreary desert through which we had been travelling so long.

From the top of the hill we had mounted we overlooked a large basin, the course of the river through it being easily traced by the green foliage of the gum trees, contrasting against the dull grey of the mulga. In the distance we noted the smokes of native fires, the first signs of life we had yet met with.

On making for the river, however, we found that the country soon resumed its desert character, and the river, now of great width, consisting of a bed of dry sand and shingle intersected with rocky bars, groves of tall gum trees lining both the bed and banks. At this point it ran a due west course, but up to nightfall we ran it down without finding any sign of water. Continuing our course the next morning we

reached a shallow spring on the southern bank shortly before noon and unsaddled and unpacked to enjoy a well-earned rest. The spring was surrounded by a good growth of bulrushes, which afforded a favourable evidence of its permanency. The water rose during the night, but became absorbed in the sand during the day, a phenomenon I have noticed in other parts of Australia. Resuming our journey, the following morning we steered a north-west course towards a high peak or bluff, the river still running towards the west. After a stiff climb we ascended this peak, and from the summit had a wide panorama spread out before us.

Apparently the river, below where we had encamped on it, ran through a succession of gorges, caused by ranges of broken hills crossing its course. These hills had precipitous sides, in which weather-worn caves were distinctly visible. South of us rose a great pile of ranges, one tall mountain overtopping all the others. To the westward was an open basin bounded by ranges with serrated crests, and northward were more flat-topped hills.

Descending, we came to a large dry creek running through a narrow valley, bounded by fantastically shaped hills of slate, the colours of some varying from bright red to pure white. This creek led us once more on to the main river. After a day spent in examining the basin in which we found ourselves, we made an excursion to the south-west. This entailed taking our horses over what appeared an almost impassable range, and it was only by great good fortune that we reached the crown of it without accident. The southern slope proved less rugged and we descended into a valley, at the bottom of which ran a sandy river nearly as large as the one we had left. It was keeping a north-west course, and would apparently effect a junction with the Ashburton some fifteen miles below where we crossed it.

That night we camped on a limestone tableland, and in the morning, as we were now far enough to the westward, we parted company to rendezvous on the newly discovered river, which I named the Cunningham. During the morning I traversed two or three of the main water-courses, and at noon returned to the Cunningham, where I met the surveyor and black boy with the pack-horses. I heard from them that when they came to the river they found themselves unexpectedly close upon a large body of natives, who refused to make friends or allow them to come to close quarters. As we had no wish provoke hostilities, we did not trouble them with any more attention, but proceeded back to the Ashburton, which we reached the next morning.

We next explored a large tributary of this river coming from the east, which we found drained a well-grassed valley and contained permanent springs at short intervals in its course.

During a stay in this region we noticed a great absence of game, and the large encampment of natives seen by Mr. Cuthbertson was the

only one we encountered. We found the extreme head of the river to be valueless for the purposes of settlement, as it takes its rise in the desert plateau that occupies a large space of the interior. On reaching a lower level, however, the river takes its course through valleys, the flats on either side being well grassed, and covered with many varieties of fodder plants, rendering them capable of being converted into first-class sheep and cattle runs.

After finishing our examination of the north-eastern tributary, we returned to camp by a different route, having been absent nearly three weeks.

Our next excursion was towards the interior, but the results were almost without interest, the country being flat and waterless, and the creeks small and fragmentary; in time, however, with the advancement of settlement, it will be valuable pasture-land.

After our return we proceeded to explore a large tract of unknown country on the southern side of the Ashburton, below our former labours. Our way led us up a creek running into the Gascoyne from the north, heading from broken scrubby ranges. Two large peaks marked the summit of the watershed, and the fall towards the Ashburton we found to be equally stony and rugged.

After some rough experience we reached the lower reaches of the watercourses, which, as formerly, broadened into wide sandy rivers, running through flats covered with different varieties of salt-bush, the whole of the valleys being admirably adapted for sheep runs. Following down one of the largest of these rivers we came to a large and richly grassed valley, through which ran a river receiving all the broken creeks which had so hampered our progress.

This valley of rich pastoral country was one of the finest and most picturesque I have seen during my travels on the Australian continent. The ranges that bounded it were most striking in appearance, presenting precipitous sides towards the valley, whereon the lights and shadows were continually changing. The bottom of this valley was fine open forest country, well grassed, and covered with many varieties of herbage and fodder plants, the whole district forming the ideal of a magnificent sheep and cattle run. On our return we followed up another large tributary river coming down through the ranges in a succession of gorges. In one of these gorges we came upon another large encampment of natives, who mounted the surrounding hills, from the top of which they watched us so long as we were in sight of them.

The result of the whole trip was the discovery of several large tributary rivers of the Ashburton, running through magnificent pastoral country, which will soon become valuable sheep runs. These rivers we named the Cunningham, the Jackson, and the James. We found the physical features of the country different entirely to the conjectural ones placed on some of the Western Australian maps, the supposed course of

the Upper Ashburton being from 20 to 30 miles out of position by the observations taken by Mr. Cuthbertson, who has a high reputation as a careful surveyor. These discrepancies are but natural, as the features sketched in the maps are purely imaginary.

The geological formation of the Ashburton is against the likelihood of any valuable mineral deposits being discovered in the future; on the head of the Gascoyne, however, there is every prospect of the country repaying a careful search for gold, the indications tending towards the existence of a reefing field rather than alluvial deposits.

There is a good underground supply of water on the Gascoyne, at the comparatively shallow depth of from 12 to 15 feet.

The aborigines of this part are of a peculiarly degraded type, being greatly below the average of the natives of the northern and eastern coasts in intelligence. Probably this is owing to the scanty game and food supply, rendering the struggle for existence very keen.

*Colonel Labre's Explorations in the Region between the Beni and
Madre de Dios Rivers and the Purus.*

Map, p. 524.

THE necessity of discovering an outlet via the Amazons to the Atlantic for the produce of the rich regions of Northern Bolivia and Southern Peru east of the Andes, which inspired some years ago the bold but unsuccessful attempt to construct a railway past the long line of cataracts and rapids which obstruct the navigation of the river Madeira, has since then led to the exploration of other possible routes, to the west of that great tributary of the Amazons. This arduous work has been undertaken by a Brazilian gentleman, Colonel Antonio R. P. Labre, and has resulted in a considerable addition to our geographical knowledge of the interior of South America. He conceived that the river-basins west of the Madeira would be found free from the physical obstacles to a road or railroad, which are so difficult to overcome on the somewhat nearer and more direct route along the banks of that great affluent of the Amazons; the country also is free from the malaria which is so fatal in the neighbourhood of the falls of the Madeira. Colonel Labre last year read a paper, giving a résumé of his various journeys, to the Geographical Society of Rio de Janeiro. We are indebted to our Associate Mr. Herbert Guillaume, Peruvian Vice-Consul at Southampton, for a copy of the paper, and for much additional information which he has obtained direct from Colonel Labre, as well as for material which has enabled our cartographer, Mr. Turner, to construct the accompanying map. The first explorer of the Purus and its tributaries, it will be remembered, was our Gold-Medallist, Mr. W. Chandless, and one of the interesting results of Colonel Labre's explorations is that they connect

the farthest points reached by Mr. Chandless on the southern tributaries of the Purus with the Beni and its tributary the Madre de Dios, two great navigable streams which flow through Northern Bolivia into the Madeira. Since the date of Mr. Chandless' journey (1865) these rivers have become the seat of the most thriving indiarubber trade in South America, and many enterprising men, chiefly Bolivians, have founded permanent settlements on their banks, and added cattle-rearing to the collecting of the rubber and other valuable produce of the boundless forests, the open campo region of the Bolivia reaching nearly to the south bank of the Beni.

The principal journey of Colonel Labre, undertaken for the purpose of crossing overland from the indiarubber settlements on the Madre de Dios to the nearest navigable point on the Aquiry tributary of the Purus, and ascertaining if the distance and the nature of the ground presented facilities for the construction of a road and eventually a railroad, was made in 1887. He ascended the Madeira from the Amazons, and a lively idea of the difficulties of this route—the only one by which the now considerable trade, to and fro, between the Amazons and Bolivia is carried on—is furnished by the fact that it took him, travelling with a well-equipped party of Bolivian traders in four canoes and two light boats (*montarias*), 34 days to accomplish the distance of 161 miles between San Antonio at the foot of the long series of falls, and the town of Villa Bella at the mouth of the Beni. Nine formidable falls or rapids had to be passed by unloading the canoes and dragging them overland on wooden rollers. To pass round the Ribeirão falls alone, a distance of three miles, took them eight days. The cost of transit for goods past these obstructions at present is from 35s. 6d. to 52s. 4d. per arroba of 25 lbs. Colonel Labre's narrative continues as follows:—

Leaving Villa Bella on the 16th June, we arrived the next day at the Esperanza Falls, equally as dangerous as the falls of the Madeira. They are distant 12½ miles from the confluence of the rivers. Leaving Esperanza at noon on the 19th, we reached the settlement of Correnteza at 3 p.m. On the 22nd we passed an indiarubber station on the left bank, and the evening of that day reached the mouth of the Orton. This river is about 110 yards wide, is navigable by steamers, and distant 50 miles from the mouth of the Beni. I ascended this river and spent a month upon it. We were received with every hospitality by Dr. Antonio Vaca Diaz, a Bolivian senator, who has a large settlement there, and employs 300 workmen.

On the 31st July we left Orton for the Madre de Dios, and arrived at night at Ribeira Alta, at the mouth of that river. On the 1st of August we ascended the river and arrived at Port Maravilha on the 9th. The river Beni up to the mouth of the Madre de Dios has many islands and small streams flowing into it, besides channels communicating with inland lakes not far from the river on either side; its banks are in general low and flat, clothed with luxuriant forest containing great quantities of indiarubber, cacao, Brazil nut, and tonkin bean.

On the 11th August we commenced our overland journey, our party consisting of eighteen of our own men and fifteen Indians of the Aradna tribe, of both sexes, half civilised. During the first day we passed several streams, and at 6 p.m. put

up in the hut of an indiarubber gatherer; the route traversed was partly over low ground covered with dense forest, and partly over more undulating ground abounding in the magnificent Brazil-nut trees (*Bertholetia excelsa*). At 2 miles distant from the Madre de Dios we passed over two small streams, which flow from Lake Arambay into a river which discharges into the Madre de Dios below the mouth of the Jenecychia.

On the 12th we passed the village of an Araúna chief, named Hatataçáda; he is chief of the tribe Equári, and his settlement is composed of seven families (twenty-six persons in all), living in a peaceful state and in civilised contact with the neighbouring white traders.

On the 13th, travelled over high land. We passed several streams, and rested for the night on the banks of the stream Babanyçáda.

On the 14th we left Babanyçáda, and reached the river Orton, a tributary of the Beni flowing from west to east, at the port of Budha; the river is here 88 yards wide. We crossed it on rafts furnished by the Araúnas, and passed the night on the left bank.

On the 15th we proceeded on our journey early, travelling away from the banks of the river in a westerly direction towards its source. At 9 o'clock passed an abandoned village Baiheçáda; at 2.45 we arrived at Nabadheçáda, an Araúna village, where we passed the night. The chief of the tribe is named Tata-chuma. We were well received by this tribe. They have idols and temples; they wear girdles and petticoats; the men wear the hair long, plaited like the Chinese. One of the women we saw was half white, and of beautiful symmetry.

On the 16th we left Nabadheçáda at 10 a.m., taking in company Tata-chuma, his wife, and four Indians of his tribe; we marched the rest of the day through the forest on firm and level ground traversed by several streams, and passed the night on the bank of a rivulet flowing into the Nabadheçáda.

On the 17th, at break of day, we struck camp and arrived at Mamuyçáda, another village of the Araúnas, at 10 o'clock. It contains about 200 inhabitants, has a form of government, temples, and a form of worship; the villagers have plantations. Some of the women are light-coloured, and have traces of beauty: none are allowed to enter a temple or to take part in the religious or 'fetish ceremonies, and it is forbidden to them to know the names or the forms of the idols. The idols are not of human form, but are geometrical figures made of wood and polished. The father of the gods is called Epymará, his image has an elliptical form, and is about 16 inches high. There are also gods of stone of different sizes. Although they have "medicine-men" charged with religious duties and remaining celibates, the chief is nevertheless pontifex of the church.

In the morning of the 18th we left Mamuyçáda at 9 o'clock, and continued our voyage, accompanied with ten men of that tribe, supplied by the chief as guides and bearers of the baggage. At noon we left the Araúna path and took a northerly course, stopping at about half a mile distant, in Hatataçáda, an abandoned Araúna village, distant two miles from the Orton, at Capa, a village formerly the abode of the chief Capa, which will be on the line of the future road which will have its terminus on the north bank of the Madre de Dios, at the settlement of Anapo, 15 miles south of Capa.

In the evening we continued our journey from Hatataçáda through a dense forest, along level country cut by innumerable small streams, and passed the night in Arunaçáda by the margin of a beautiful stream of water, pure as crystal.

On the 19th we continued our march through the forest towards Cuyneputhsia, an abandoned village, arriving there at 11. It still had a good house, a small temple with clean courtyard in circular form. We found in the village a chief

named Tata Runa, with his two wives and two sons, who came to visit the temple and plantations. We were well received by him, and he guaranteed us peace with his nation, and undertook to take us to the neighbouring people, the Guarayos, his allies. To confirm the treaty, we made him a present of tools, beads, clothes, and a uniform with officer's cap to match. With these presents he was much pleased; he slept with us in this village, and we started together next morning for Tupenaputhsúa, his new settlement.

On the 20th our direction was westward, leaving our former north-west course (the Guarayan road). At 2 p.m. we arrived at Tupenaputhsúa, where we were received with demonstrations of joy by a second chief named Cunupáro, and we slept there.

On the 21st we made a halt, at the request of the chiefs, in order that they might prepare themselves for accompanying us with part of their people, and take us to the settlement of the Guarayos tribe, their neighbours.

This tribe or clan numbers sixty individuals, divided into eighteen families, and governed by two chiefs, Tata Cunupáro and Tata Runa. They are agriculturists, and have the same habits, customs, and religion as the Araúnas, but their dialect is different, although they understand one another. In this village we found two Indians of the Guarayo tribe, united by family ties, who engaged themselves to accompany us to the chief of their nation.

On the 22nd we slept again in Tupena, and only on the day following, after dismissing the Araúna guides and carriers, did we proceed on our journey.

On the 23rd we proceeded on our journey of exploration, quitting the Cuyné to take the cross road which leads to the Guarayos settlements; at 9.30 a.m. we fell in with the Guarayan road, and at 10 we passed a small settlement of the Cunupáro people. At night we rested on the bank of a clear stream, the Samayecada, where we experienced a severe thunderstorm. Between Tupena and this place we passed several rivulets of beautiful clear water.

On the 24th at 7 a.m., we resumed our march towards the river Caramánu (Abuná), on the banks of which we arrived at 3 p.m., and rested at the Guarayan crossing-place. The banks of this river are clothed with a most luxuriant and lofty forest, abounding in indiarubber, cacao, and Brasil-nut trees.

On the 25th at 7 a.m., we crossed the Caramánu by a natural bridge formed by a large tree which had fallen across the stream. At this place the river is 33 yards wide. In ten minutes all our people had passed over, and we resumed our march through a dense forest accompanied by the Pacaguáras and Guarayos.

At 5 p.m. we arrived at Huatchaputhsúa, a large Guarayo village abandoned a year ago. It still contained a large house in a good state of preservation, and a temple with two doors, in which many idols, ornaments, and weapons were still remaining.

On the 26th we left Huatchaputhsúa, taking the road for Timbyannyhan, arriving there at 9.30 a.m. by a good road, our course being still north-west. We were well received by the Guarayan chiefs and people. The chiefs are named Tata Cumaríhuá, Tata Cahasty and Tata Cayuary. The settlement consisted of 60 inhabitants, and judging by the numerous paths and the abandoned villages we had passed, there were apparently other settlements in the vicinity.

On the 27th we dismissed the Pacaguáras, keeping in our train Tata Cunuparo, as the Guarayos were afraid to take us to the neighbouring settlements. The Guarayo chiefs Cayaty and Cayuary with eight Indians as carriers joined us. Thus reorganised for our further journey, we struck camp at 7 a.m., and resumed our march. At noon we passed a large clearing about four miles in circuit, and having two large abandoned houses in the middle, where we found two large kettles of burnt

clay, 3½ feet high, and many articles of ornament contained in woven straw bags. An Indian was here, guarding the plantations of coca, which they consume largely.

From this place we continued our course for Cannamary, passing by many very old abandoned villages, roads crossing each other in all directions, and small cultivated fields, in one of which was a hut containing eight Indians, recently established, who received us with manifestations of peace and great joy.

Accompanied by these Indians, we continued our journey and reached Cannamary at 6 p.m. It is a group of five or six settlements in close proximity. One of the chiefs threatened to kill the chief Cunuparo, who accompanied us, for having brought white people, who were their enemies. Cunuparo was greatly frightened, and wept like a coward. In consequence of this hostile demonstration we retired a distance, and passed the night in the forest. They, however, followed us unarmed and annoyed us until late at night.

On the 28th, at break of day, 5 a.m., we started on our journey with two chiefs, Tucano and Hyacapareh, whom we had asked to accompany us, and who brought 15 carriers; we paid them with iron implements, clothes, glass beads, and other trifles, with which they were much pleased. We travelled along a good road, passing three villages with good houses and plantations. All the people fled, and avoided our presence. One of the chiefs, however, afterwards came to us and agreed to accompany us with five of his tribe. At 5 p.m. we arrived at Cannarana, where we passed the night.

On the 29th the two Cannamary chiefs returned with their people to their homes, leaving us with three of their men, who, with some of the Cannarana people, accompanied us to the river Aquiri. Whilst at Cannarana I felt certain that we were near the Aquiri from the information given us by the Indians. This belief caused us all great joy and animated the spirits of the whole party. We marched until 3 p.m., when we reached the border of a lakelet of clear water, which takes the name of Brejo da Ponte. Late at night five or six of the Cannarana Indians escaped with their chief, upon which I placed the other chief and the remaining Indians under arrest, to which they submitted without a murmur.

Between Cannarana and Brejo da Ponte we passed two villages of the Hyapurinã tribe, the inhabitants of which fled at our approach.

On the 30th at 5 a.m. we struck camp, and at noon reached the banks of the Aquiri, which the Cannaranas call Muchanguy.

The settlers at Brejo da Ponte manifested the greatest joy at our success. We had solved the problem of a practicable route between the Aquiri and the Beni, which pleased them, as they anxiously desired to open up communication with Bolivia. From the settlement of the indiarubber trader Manoel Joaquim, we continued to Flor do Ouro, another station belonging to Senhor Geraldo Correia Lima, who received us with boundless hospitality.

On the 2nd Sept. my companions returned by the road we had come, and arrived at the Madre de Dios after a journey of eight days.

My expedition had thus opened up a route of communication between the large towns of the Amazons and the whole of northern Bolivia, a route which may be easily extended to southern Perú by the navigation of the Madre de Dios to the province of Paucartambo, and the rich and populous province of Cuzco.

From the station Flor do Ouro, or at least the trading settlement of Novo York, 11 miles further down, the Aquiri is now reached during six months of the year, by steamers from Pará at the mouth of the Amazona and Manaus on the Rio Negro, and in the other six months (the dry season) by boats, as at lowest water the upper Aquiri is not less than four feet deep.

On the 3rd Sept. I started on my journey down the Aquiri and Purus to the

Amazons in a small boat (*montaria*) which was upset three days afterwards, and the voyage was continued on the 9th in a steam launch as far as Cachoeira on the Purus whence I departed on the 8th Oct. in the steamer *Conde d'Eu* for Manaus on the Rio Negro.

The distance from Novo York on the Aquiri to Amapo on the Madre de Dios is 93 miles. The road crosses two rivers, the Caramánu or Abuna at Guarayo, where it is 33 yards wide in the dry season, and the Tanamánu or Orton at Capa, which is 90 yards wide. If this road should be adopted, especially if a railway be constructed, it will become the highway for all the trade of the basins of the Mamoré and the Beni, as well as the Madre de Dios, with their vast ramification of river navigation, as far as the neighbourhood of the cities of La Paz, Cochabamba, and Santa Cruz de la Sierra.

The River Ituxy.—Long previous to the Aquiri journey, Colonel Labre, between the years 1872 and 1885, had explored the Ituxy and its affluents many times, with the same object of discovering a practicable means of communication with the Beni. These journeys made him familiar with this great tributary of the Purus and its affluents, its savage inhabitants, and natural resources. He says it flows in a direction from south-west to north-east, discharging into the Purus in $7^{\circ} 18' 48''$ S. lat. and $64^{\circ} 41'$ W. long., according to the observations of Chandless. The river is navigable by steamers during the wet season from its mouth up to the falls, near the confluence of the Eutimary and Huakery, a distance of 370 miles. In 1884 he took two steamers up to the mouth of the river Curykethé, 200 miles from the Purus, and established indiarubber stations, which still continue. Since then a few steamers ascend its waters every year in the rainy season, and so its navigability is fully proved.

The banks of the Ituxy are generally low as far as the mouth of the Curykethé, and they are often flooded during the wet season, but beyond this point the banks are much higher and the ground more undulating and drier. In the wet season its waters are black. Like most of the rivers of the Amazons it has many lakes inland near its banks. Its soil is good for agriculture, and clothed nearly throughout with forest.

Colonel Labre estimates the number of indigenes, still in a wild state, inhabiting the river Ituxy and its affluents up to its source at 8000. They are divided into ten tribes, each having numerous small villages governed by one or two chiefs. The most numerous tribes are the Cacharary, Canamary, Guarayos, Hypurinás, Huatanary, Pamary, Pamaná, Catauixi, and Hyumás. The Hyumás are ferocious and warlike. A chief of the Hypuriná nation lent Colonel Labre great help on his last exploration of the Upper Ituxy. In 1879, three youths of the tribe were entrusted to him for education. One of them, who now knows how to read and write, he baptized under the name of Ulysses, with his original savage name of Mangah as surname. He is an intelligent youth, with pleasant features.

When he visited Rio de Janeiro in 1888, Colonel Labre petitioned the Brazilian Government to provide religious instruction for these savages, who at present lead a wild life, and are of little use to the civilised settlers. He believes that the Purus and its affluents contain about 40,000 indigenes, speaking forty or more different languages.

Road east of the Ituxy to the Beni, with branch to the Madeira below the falls.—A third line of communication between the Purus and the Beni is proposed by Colonel Labré, who partly worked it out by actual exploration. It commences at Labrea, on the Purus, near the mouth of the Ituxy, and ends at Correntezza, on the

Beni, a distance of 240 miles ; with a branch at 9° S. lat. to San Antonio, on the Madeira. Many years ago he explored this route by land from Labrea for a distance of 120 miles, and found the greater part of the distance an open somewhat elevated grassy plain ; but further south, the river Abuna, with its wooded banks, peopled by cannibal Indians, offered an obstacle which prevented him from extending his journey to the Beni. He suggests that a short road from the south bank of the Beni, opposite Correnteja, to Guajara-mirim, on the Mamoré (or Upper Madeira), where the long series of falls and rapids, 180 miles in length, of this great stream come to a termination, would attract the trade of the Brazilian province of Matto Grosso.

GEOGRAPHICAL EDUCATION: THE YEAR'S PROGRESS AT OXFORD.

MR. H. J. MACKINDER, M.A., Reader in Geography at Oxford, has sent to the Council of the Society the following Report on the progress made during the year :—

7th July, 1889.

GENTLEMEN,—Another academical year has passed, and I am happy to report that it has been on the whole a year of steady progress. I have delivered my usual courses of lectures in the University to audiences on the average twice as large as those of last year. My subjects have been—

1. The Physical Geography of the Continents.
2. The British Isles.
3. The History of Discovery.
4. Western and Central Europe.
5. The Mediterranean and Mediterranean Lands.
6. Russia and Asia with reference to History.

Prof. Freeman, Mr. Sidney Owen, and Mr. George have also lectured on geographical subjects in one or more Terms.

Although we have thus more than maintained the footing gained in the previous year, I am still bound to devote my attention chiefly to the future. I have now lectured on most of the subjects which seemed likely to attract an audience in the present state of University studies, and I find that the number of that audience will vary from 5 to 80, according to the subject announced. The great majority of my students are reading for History honours, and it is clear that if the Readership is to have an established position and a wide influence in the University, it must be through the History school. I have therefore recently put myself in communication with the History Lecturers, at first individually and afterwards collectively. A serious difficulty presented itself at the outset. Until within the last few years there was set in the examination a separate paper on Geography. In the course of a radical change in the organisation of the school this paper disappeared. Compulsory Geography questions are now set in the History papers ; but since these papers refer to special periods, the geographical questions tend to be very limited in scope. It was suggested that I should lecture on the geography of special periods. This I refused to do, for I felt that it would make my teaching merely historical. Yet it was clear that unless the separate geography papers were re-established, minute geographical teaching, except in the special periods, was impracticable. One thing remained, and that was to offer to all historical students an elementary course, which

should attempt to convey to them a general, but clear and vivid conception of the theatre of history. I am happy to say that this proposal met with the approval of the lecturers, and that I was able to devote myself at once to the maturing of the scheme. Twenty-one out of my forty-two lectures next year will belong to the Historical course. They will be delivered weekly, seven in each term, and at an hour free from other lectures. The subjects will be—

1. Introductory.
- 2-5. British Isles.
- 6, 7. North America.
- 8-12. Central and Western Europe.
13. Russia.
14. Central Asia.
- 15-19. Mediterranean Lands.
- 20, 21. India.

If successful, it is intended that this course of teaching should be repeated annually, with such alterations as experience may suggest. By unofficial information I am led to hope for a large class.

Having thus endeavoured to infuse Geography into the general life of Oxford, I do not hesitate to devote the remaining twenty-one lectures to less "paying" subjects. By way of maintaining my protest in favour of Physical Geography, I shall lecture next term on the "Physical Geography of the British Isles." My class will probably be a small one. I am writing away from Oxford, but I believe I am correct in saying that Mr. George will lecture on geographical subjects during one term at least of the approaching year.

I have not as yet been able to complete the arrangements for illustrating my lectures, but I hope soon to do so. One of my students, Mr. Darbishire, of Trinity College, constructed for my lectures at the Oxford Summer Meeting of Extension Students last August two large diagram maps, which attracted so much notice, that this August such maps will be strongly in fashion. Mr. Darbishire will be busy all July drawing them for Prof. Max Müller and others. I trust to be able to make arrangements so as to secure Mr. Darbishire's services during the coming year for the construction, under my supervision, of a series of diagrams for my University lectures.

In the past session I have delivered 112 Extension lectures in the following towns:—Plymouth, Exeter, Torquay, Tavistock, Brighton, Tunbridge Wells, Swindon, Southbourne, Wolverhampton, Middleton, and Altrincham. The total number of students was over 2000. Mr. Bates acted as examiner. I have also lectured on the "Teaching of Geography" at the Stockwell Training College and before the Central Teachers' Guild in London. In the interests of my University and literary work, I find it necessary to reduce the amount of my Extension work for the future. In the next session I am to lecture at Wells, Weston-super-Mare, Clevedon, Rochester, Leamington, Runcorn, and Altrincham.

I remain, Gentlemen,

Yours very truly,

H. J. MACKINDER, M.A.,
Reader in Geography.

GEOGRAPHICAL NOTES.

Ascent of Mount Owen Stanley, New Guinea.—In a brief telegram to the Secretary of State for the Colonies, the Governor of Queensland announces that Sir William Macgregor, Administrator of British New Guinea, has returned to Port Moresby after a most successful exploration of a crest of the Owen Stanley range named Mount Victoria, 13,121 feet above the sea. He has also discovered a new mountain, north of the Owen Stanley range, 12,500 feet high, which has been named Mount Albert Edward, and many other peaks of a little lower elevation.

Explorations in South-eastern New Guinea.—In one of his recent tours of inspection, Sir William Macgregor, in January last, examined the district between Watinau, in Milne Bay, and Huhunah, in Bentley Bay, and observed the nature of the country along the range of mountains ending in East Cape. The range is covered with forest, though the trees are not large, and viewed from the summit the north side, facing Bentley Bay, is seen to be nearly bare of trees, the virgin forest having been cleared by the natives within probably a couple of generations. The district is fully inhabited and can supply no crown lands; the number of coco-nut trees is, however, so great that a considerable trade is carried on by the copra collectors. On the same tour Sir William visited, among many other little-known places, Tubutubu, a small island of the Engineer group. These people are great traders, and the island is very populous. He saw there four fine sea-going canoes from 45 to 50 feet in length, and about 6 feet beam. Some days afterwards (Jan. 23rd) he started from Maivara, at the head of Milne Bay, with the intention of crossing overland to Mullens Harbour. The first five miles of the walk was across a rich alluvial flat, held by a large population of natives. A low range of hills was crossed at the distance of 6 or 7 miles, at an elevation of about 800 feet; the formation is of basalt on the Milne Bay side, and coral limestone on the side next to Mullens Harbour, and the whole is clothed with forest. Having crossed the range, a fine little river, the Sagarai, was crossed, which falls into the head of Mullens Harbour. The natives along its banks and further on, along a rich plain to the south-west, received Sir William and his party in a friendly manner. The latter part of the journey was performed in canoes, and from Mullens Harbour a further journey of about five miles was undertaken for the purpose of visiting a fierce and hostile tribe, the Werewere, and impressing upon them the necessity and policy of being on friendly terms with the Government. The party then returned to Milne Bay.

Another Ascent of Kilima-njaro contemplated.—We learn that Dr. H. Meyer intends making another attempt to ascend to the summit of

Kibo, which he failed some time ago to scale completely; he is to be accompanied by an Alpinist, Dr. Partscheller. He will afterwards proceed to explore Mount Kenia.

German Explorations in the Indian Archipelago.—Professor A. Wichman has, according to Petermann's 'Mittheilungen,' returned recently to Europe from his voyage to the Dutch East Indies. After an excursion along the south coast of Flores in December last, he effected in the following month an exploration of the vicinity of Larentuka in the east of the island, and then proceeded to Timor, where he studied the carboniferous limestone in the environs of Kupang. On the little island of Samauw, lying off the coast, he found numerous mud volcanoes. In an excursion to the island of Rotti, which is situated at the south-west end of Timor, he discovered upon the slopes, on two mud volcanoes, some ammonites and belemnites, the first Jurassic fossils which have been found in this archipelago. In Rotti, as in Timor and Flores, tertiary chalk reefs are the prevailing formation. After visiting several other islands he landed at Palos, on the island of Celebes, and struck across to the bay of Tomini on the east coast. The route was difficult, and lay over a mountain range about 3000 feet high, covered with primeval forests and uninhabited; these mountains are composed of gneiss, crystalline slate, and granite.

M. Grum-Grijmailo's New Expedition into Central Asia.—This indefatigable traveller started in April last, in company with his brother, upon an exploration of the eastern Thian Shan, where he will endeavour to connect the surveys of Prjevalsky with those of Potanin. From the Thian Shan he will travel by way of Turfan to Lake Lob Nor, and thence explore the Altyn-tag Range.

Exploration of the Timan Mountains, Northern Russia.—It is announced that an expedition has been despatched by the Russian Government to explore the Timan Range, situated to the west of the river Petchora. The leadership of the expedition has been entrusted to M. T. Chernyschef, the geologist; a topographer and an ethnographer, the latter deputed by the Imperial Geographical Society of St. Petersburg, will accompany the party.

The Climate of the State of Oregon.—Some interesting observations with reference to the climate and rainfall of Oregon occur in a report by Mr. Laidlaw, Vice-Consul at Portland, which is contained in Foreign Office Paper No. 526. The mild temperature of this region, so northerly situated, is due to the warm Japan current, which flows along the coast, and to the Rocky and Cascade Mountains, standing as a barrier to ward off the cold Arctic winds. Generally speaking, the range of temperature from summer to winter is small. Oregon has really six distinct climates, viz. (1) the coast region, the climate of which is warm and mild, with

little variation in summer or winter. There is a sea-breeze during the day, fog in summer, and excessive rains in winter. (2) The Willamette Valley, where it is foggy in the mornings of spring and autumn, warm in summer, with a heavy rainfall in winter. (3) The Umpqua Valley, which possesses a delightful climate, with mild summer and winter temperature, occasional showers in summer and snows in winter, with very light winds throughout the year. (4) The Rogue River Valley has also a fine climate, warmer and drier in summer and colder in winter than that of the Umpqua Valley. (5) The climate of the lake region in the south-east of Oregon, situated among the mountains, is very cold in winter, but the summer temperature is pleasant. The rainfall is light but the snowfall is considerable. (6) The climate of the eastern plateau region is warm and dry in summer, cold in winter, with an annual rainfall of about 15 inches and considerable snow.—With regard to rainfall in the Humboldt Country, Mr. Consular Agent Hodgson states that before the United States Signal Station was established there the theory prevailed that there was no rainfall in that region during the summer months, but the following table for 1888 shows the contrary:—January, 12.95 inches; February, 1.98; March, 4.09; April, 1.05; May, 0.76; June, 4.66; July, 0.44; August, 0.08; September, 0.06; October, 1.15; November, 3.41; December, 5.93; total for the year, 36.56 inches; in 1887 the fall was 39.67. However, the rainfall of mid-summer is not rainfall according to the common use of the term, but rather a fine precipitation from dense fog, which, while it answers the demands of growing crops, does not interfere with the pleasures of outdoor life. The mean annual temperature in Humboldt Country was 52°·5; the lowest monthly average was 44°·6 in January, and the highest 58°·8 in June, showing a wonderful evenness throughout the year.

International Congress of Geography at Paris.—The International Geographical Congress, specially convened by the Geographical Society of Paris, in connection with the Exhibition of this year, will meet on the 5th of August. Our Society has appointed as its delegates to the Congress Mr. Francis Galton, F.R.S. (Vice-President R.G.S.), Sir Frederic Goldsmid (Vice-President R.G.S.), and Admiral Sir Erasmus Ommanney, C.B., F.R.S.

[illegible]

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, Librarian R.G.S.)

EUROPE.

Baddeley, M. J. B. [B.A.]—Thorough Guide Series. The English Lake District. With Maps, General and Sectional (corrected up to date from the Ordnance Survey). By J. Bartholomew, F.R.G.S. Fifth edition, revised and enlarged. London, Dulau & Co., 1889: 12mo., pp. xxix. and 249. Price 5s. [Presented by Messrs. Dulau & Co.]

Baedeker, K.—The Rhine from Rotterdam to Constance. Handbook for Travellers. With 36 maps and 22 plans. Eleventh revised edition. Leipsic, Karl Baedeker; London, Dulau & Co., 1889: 12mo., pp. xxxiv. and 386. Price 6 marks. [Presented by Messrs. Dulau & Co.]

Boué, Ami.—Die Europäische Türkei. (La Turquie d'Europe par A. Boué. Paris, 1840.) Deutsch herausgegeben von der Boué-Stiftungs-Commission der Kais. Akademie der Wissenschaften in Wien. Wien, F. Tempsky, 1889: 2 vols. 4to., pp. (vol. i.) x. and 674, (vol. ii.) 564; portrait.

This is a German translation of the author's work '*La Turquie d'Europe*,' published at Paris in 1840.

Coolidge, W. A. B.—Swiss Travel and Swiss Guide Books. London, Longman, & Co., 1889: 8vo., pp. xi. and 336. Price 10s. 6d. [Presented by the Publishers.]

Mr. Coolidge, the editor of the '*Alpine Journal*,' is known as one of the greatest authorities on Alpine matters. In this interesting volume he has brought together much curious and suggestive information. The first section works out a new side of the history of travel in Switzerland—the development of guide-books and other means of travel; it is really, to some extent, a history of the growth of our knowledge of the Alps. The copious bibliography appended will be highly serviceable. The second section traces out the history, mainly from a traveller's point of view, of the village of Zermatt, and is intended to illustrate the practical application of a system sketched in general outline in the first section.

Giglioli, E. H.—Ministero di Agricoltura, Industria e Commercio. Direzione Generale dell'Agricoltura. Ufficio Ornitologico. Primo Resoconto dei risultati della Inchiesta Ornitologica in Italia. Parte prima, Avifauna Italiana. Elenco sistematico delle Specie di Uccelli stazionarie o di passaggio in Italia con nuovi nomi volgari e colle notizie sin qui fornite dai collaboratori nella inchiesta ornitologica. Firenze, 1889: 8vo., pp. vii. and 706, map. [Presented by the Author.]

Gopčević, Spiridion.—Makedonien und Alt-Serbien. Wien, Seidel, 1889. Imp. 8vo., pp. vii. and 511. Price 20s.

M. Gopčević has already published several works dealing with the Balkan States. The present handsome and richly illustrated volume describes in the first place his own travels through Macedonia and old Serbia; the second deals with the Serbo-Bulgarian struggle over these regions, and abounds with historical, linguistic, and archaeological information, with details as to the customs and folk-lore of the people, besides a variety of statistical and geographical information.

Heins, Maurice.—L'Évolution topographique d'une Grande Ville. 'Bulletin' of the Société Royale Belge de Géographie. May-June, 1889.

The great city, the evolution of which is traced in this interesting paper, is Gand.

Steeb, Ch. [Ritter Von].—Die Gebirgs-Systeme der Balkan-Halbinsel. 'Mittheilungen der K. K. Geographischen Gesellschaft in Wien,' No. 5, 1889.

Tissot, Victor.—Unknown Switzerland. Translated for the twelfth edition, by Mrs. Wilson. London, Hodder and Stoughton, 1889: 8vo., pp. x. and 361. Price 6s. [Presented by the Publisher.]

The "Unknown Switzerland" with which M. Tissot deals includes mainly Lucerne, the St. Gothard railway, the Engadine, the Valais, and the Gruyère; there is no map.

Trinius, August.—Thüringer Wanderbuch. Minden i. Westf., Brun. 2 vols. 8vo., vol. i. 1886, pp. xii. and 438, vol. ii. 1888, pp. x. and 420.

In these volumes is gathered together a great variety of information, geographical, historical, and antiquarian, on the Thuringian region; and to any one visiting that interesting region they ought to prove serviceable.

ASIA.

Blanford, Henry F.—A Practical Guide to the Climates and Weather of India, Ceylon, and Burmah, and the Storms of the Indian Seas, based chiefly on the publications of the Indian Meteorological Department. London, Macmillan & Co., 1889: 8vo., pp. xiii. and 369. Price 12s. 6d. [Presented by the Publishers.]

No one is so competent to deal with the climate of India as Mr. Blanford, who has been for many years head of the Meteorological Department of our great dependency. In this volume he has brought together the leading results and conclusions of many years' observations over a wide field, and for the geographer it will be invaluable as the authority on the climate of Indian and neighbouring regions. As Mr. Blanford states, owing mainly to the systematic work of the Meteorological Department, established in 1875, we now possess a far better knowledge of the weather and climate of India than of those of any other tropical country, and, in many respects, better than those of many parts of Europe. This Mr. Blanford ascribes to the greater simplicity of the processes concerned, and to the prominence and regular recurrence of the more striking phases of the seasons. The official reports of the department are practically a sealed book to many interested to the climate of India. Mr. Blanford has, therefore, done high service in supplying so important a want. This work, to use his own words, supplies in a compendious and apprehensible form such information as is constantly in demand by those engaged in administration, in agriculture, sanitation, engineering works, and the like, and especially in the navigation of Indian Seas, or by those who wish to follow intelligently the current reports of the weather issued daily at Simla and Calcutta. The text is singularly free from technicalities. The first part gives a concise general description of the kinds of observations made at Government observatories, and the information they directly afford. This constitutes what may be termed the elements of the climate and the weather. The second part deals with the practical applications of weather knowledge. In the first part, to use the words of the preface, the intensity of the sun's heat in India, the air temperature, humidity, clouds, wind, rainfall, together with the principal variations they present in different parts of the Empire, and the changes they undergo in the course of the year, the behaviour of the barometer, and the methods of interpreting and utilising its teachings, and the constitution and nature of storms, are briefly described in separate sections. The second and more extensive part is devoted to a detailed notice of local climates—first, those of the chief hill stations, and then those of the different provinces of the low countries. Then follow the weather characteristics of the three Indian seasons, illustrated by the information furnished by the daily weather charts published at Simla; the tracks and seasons of storms on the seas around India, with some practical directions for the guidance of seamen; and, finally, the statistics of rainfall, evaporation, and wind pressure. In this section an attempt has been made for the first time to estimate the average rainfall of some of the chief river-basins, a datum of great importance to physical geographers, not less than to engineers. In the appendices are collected a variety of useful statistical data.

Bretschneider, E.—*Mediæval Researches from Eastern Asiatic sources. Fragments towards the knowledge of the geography and history of Central and Western Asia from the 13th to the 17th century.* London, Trübner & Co., 1888: 2 vols. 8vo., pp. ix., 334, and x., 352, with a map of Middle Asia and a reproduction of a Chinese mediæval map of Central and Western Asia. Price 21s.

These volumes, edited for Trübner's Oriental series by Dr. Bretschneider, the accomplished Russian Sinologist, late physician to the Russian Legation at Peking, are for the most part reprints of his earlier works issued separately under the following titles: "Notes on Chinese Mediæval Travellers to the West," published in 1875; "Notices of the Mediæval Geography and History of Central and Western Asia," published in 1876, and "Chinese Intercourse with the countries of Central and Western Asia during the fifteenth century," in 1877. By combining these learned excerpts and fragments in one work, Dr. Bretschneider has, in our opinion done good service not only to the student, but to the general reader interested in the literature of the East. Since those former editions were published there has been a great advance in our knowledge of the countries of Central and Western Asia chiefly through the explorations, researches, and writings of Russian savants. Access to these sources of information has enabled our author to illustrate obscure passages and to identify many of the places mentioned. Like Colonel Yule, he leaves no stone unturned to throw light on his travellers' footsteps, but while the former views the countries of Asia from the Western standpoint, Dr. Bretschneider's narratives come from the extreme East. His travellers are military and civil officials, sent on missions by Chinese emperors and Mongol khans, a Buddhist monk, and lastly an Armenian king.

Further interesting materials are afforded by Chinese and Mongol records. The first refers to the Kitan or Kara-Khitai, the Liao dynasty of China (916-1125), whose name has survived in "Kathay" or "Cathay," the name applied by the mediæval travellers to northern China, and in "Kitai," by which Russians call the whole of China. The French writers Visdelou and De Maille, have written on the Liao dynasty but our author gives a new and fuller translation of the work they derived their information from, besides adding particulars from other sources. He discusses the probable site of the ancient capital of this dynasty, locating it on the lower Chui or Chu river, where modern travellers have seen extensive ruins, and of Talas or Taras near a river of the same name not far from the modern Auliye-ata, where remains have also lately been discovered.

The next section of the work treats of the Ugurs, the Hui-hu of the Chinese, a people whose origin is spoken of in the history of the Tang dynasty (618-907 A.D.). The Ugurs were at first seated in Northern Mongolia, north-east of Karakorum. Here internal dissensions weakened them and about the middle of the 9th century they were dispersed. But with the vitality and energy characteristic of their race they regained their power and founded two separate kingdoms, one in Eastern Turkistan in the vicinity of Kara-Kodjo, the other on the confines of Western China in the districts of Kan-chau, Kua-chau, and Sha-chau. These kingdoms enjoyed for a time complete independence, and under Bugu Khan, king of the Ugurs, developed into an extensive empire. Later this people became tributary to China and their princes served in the expeditions of Jinghiz Khan and other great conquerors. Plano Carpini believed them to be Christians, doubtless because they had borrowed the alphabet of the early Nestorian missions in reducing their language to writing.

Dr. Bretschneider passes next to the Muhammadans. The Arabs, styled "Ta-shi" in the Chinese writings, as early as the 8th century established great factories in Canton, and continued their intercourse with China both by land and sea in the 10th, 11th, and 12th centuries. The Archimandrite Palladius states that at Si-ngan-fu, where the celebrated Nestorian tablet was found, a Muhammadan monument was also discovered bearing the date 742 A.D., and recording that Islam first penetrated into China during the reign of the emperor Kai-huang (581-600). But at this date, as Dr. Bretschneider remarks,

Mahomet was still an obscure merchant. Great confusion appears subsequently in Chinese literature owing to the names "Hui-hui" and Hui-hu being applied both to Uigurs and Muhammadans, probably because of the acceptance of Islam by the Western Uigurs. Our author feels certain that the Muhammadans of Yunnan, the so-called Panthays who captured Ta-li-fu from the Chinese in 1857 and maintained their power till 1873, may be traced back to the time of the Mongol emperors. The first volume of the work concludes with notices of the warlike expeditions of the Mongols to the west. From a comparison of Eastern and Western writers it appears that the accounts given by Rashid-eddin are remarkably borne out by the Chinese annals, though these latter fall into great confusion about names and dates, and require all the skill and learning of our author to reduce them to order. When we read of how these Mongols carried their victorious arms to Kashmir on the south and to Kief on the west, how they laid under contribution the whole of what is now known as Eastern Europe, overran Russia, capturing its cities and massacring its population, or dragging them away into slavery, we have difficulty in recognising as their descendants the scattered remnants of tribes now eking out a precarious existence in the mountainous regions of Central Asia, living in constant dread of their predatory neighbours the Kirghiz and the warlike fanatical Dzungars, and ready to flee at the sight of a stranger.

In vol. ii. part 3, Dr. Bretschneider explains a Mongol-Chinese mediaeval map of Central and Western Asia, identifying the geographical names. This is probably the oldest Chinese production of the kind extant, and may be compared, as far as Asia is concerned, with the Catalan map of 1375. According to our cartographical notions, it is no map at all, but merely a number of names with rectangular lines to represent territorial divisions. There are no rivers, lakes, or mountains marked, and the interest consists in the identification of the names, of which there are more than 100. In his introductory remarks Dr. Bretschneider gives a general sketch of the territorial division of Asia under the immediate descendants of Jinghiz at the date of the map, and then notices briefly each place marked on it, giving the Chinese phonetic monosyllabic rendering of the names. Thus we have Ko-mu-li for Hamul or Hami, Ta-shi-ba-li for Tashbalik, Ta-bo-t'e for Tibet, &c.

Lastly, part iv. refers to the Chinese intercourse with the countries of Central and Western Asia during the 15th and 16th centuries—the period when the Ming dynasty held the throne of China, having deprived the Mongols of their power and confined them to their original seats in Northern Mongolia. At this time the "Middle Empire," comprising Eastern and Western Turkistan, with Transoxiana, was ruled over by the descendants of Jagatai, son of Jinghiz. This empire, together with northern parts of Persia, Irak Arabi, Mesopotamia, and Armenia, afterwards fell under the subjection of the great conqueror Timur, whose sudden rise to power alarmed the Ming emperors and prompted them to open intercourse with him by means of friendly embassies. The accounts given by the envoys sent on these occasions of the countries they pass through afford interesting comparisons with those of the Spanish envoy Clavijo, who was at Timur's court at Samarkand in the same period, of Schildberger, the Bavarian, whose narrative was edited by Captain Telfer for the Hakluyt Society, and of other Western travellers whose accounts are collected in Colonel Yule's 'Cathay,' published by the same Society in 1866. More detailed information on Northern China in the 15th century is found in the 'Kitai nameh' written in Persian by Said Ali Ekber, a Muhammadan merchant, who wrote in 1516. A complete MS. copy of this work is in the possession of M. Ch. Schefer, who has translated chapters of it in the 'Mélanges Orientaux'. A curious though somewhat obscure passage from Mendez Pinto is cited by our author, proving that Russians were in Northern China as early as about the year 1543, though the first recorded Russian intercourse with China dates from the following century (1620).

Thirteen chapters of the 'Ming shi' or Ming history are devoted to foreign countries, and our author gives brief abstracts from them. They treat of the Mongols and the Oirats or Western Mongols, the Niuche or Churches, and the countries of the West—Hindustan, Eastern and Western Turkistan, Western Asia, &c. Regarding the Western Mongols, the Kalmyks of the present day, excellent material is contributed by V. Uspensky, now Russian consul at Kulja,

in the 'Memoirs of the Russian Geographical Society' (Ethnography VI.), by Professor Pozdnéyeff of the St. Petersburg University, who has translated the Mongol annals, and by Mr. H. Howorth in his 'History of the Mongols.' Dr. Bretschneider's work is a valuable compendium of mediæval geography, carefully sifted and weighed by his own critical faculty, and illustrated by modern travel.—[E. D. M.]

Branda, Paul.—Le Haut-Mékong ou le Laos ouvert. Nouvelle édition. Paris, Librairie Fischbacher, 1889: 8vo., pp. 88, maps. Price 1s. 6d.

This edition contains an additional 24 pages forming an appendix mainly consisting of a reprint of two letters published in the "Bulletin" of the "Société de Géographie Commerciale de Bordeaux" for 1887. The first of these is by M. Noël Pardon on the Cataracts of Khon; the other, by M. de Fésigny, deals with the Rapids of the Upper Mekong. Two new maps are added to this edition.

Lanessan, J.-L. (De).—L'Indo-Chine Française. Étude Politique, Économique et Administrative sur La Cochinchine, Le Cambodge, L'Annam et Le Tonkin. Paris, Alcan, 1889: 8vo., pp. vii. and 756. Price 11s. 3d.

This is a useful and apparently trustworthy general account of the present condition of the various countries over which the French hold sway in the far east. It is somewhat similar to the author's 'La Tunisie,' published in 1887, and is to some extent the result of his own observations, as he spent many months visiting various parts of the countries dealt with. In a very suggestive introduction the author discusses the general subject of the evolution of the peoples of the extreme east, independent or under European control, and also lays down what appear to him to be the general rules directing modern colonisation.

[**Palestine.**]—The Survey of Eastern Palestine. Memoirs of the Topography, Orography, Hydrography, Archaeology, etc. Volume I.—The 'Adwân Country. By Major G. R. Conder, D.C.L., R.E., 1889: 4to., pp. xi. and 304, map, plans, and illustrations.

Percival, William Spencer.—The Land of the Dragon. London, Hurst & Blackett, 1889: 8vo., pp. vii. and 338, map and frontispiece. Price 12s. [Presented by the Publishers.]

An account of boating and shooting excursions to the Gorges of the Upper Yang-tze. From Shanghai, where the author officially resided, the river was ascended as far as the Mitau Gorge, a distance of nearly 1250 miles. To an account of this journey the volume is largely devoted. On returning to Shanghai, a trip was made to the Tai-Hu Lake, situated to the west of the city. Although covering no new ground in these excursions—the region having previously been visited by Mr. Archibald J. Little and others—the descriptions of the different places seen on the way, incidental notices of the river and of the country along its course, the various caves and glens explored, &c., &c., will be found useful. The first chapter is devoted to a description of Shanghai. There is no index.

[**Persian Gulf.**]—Die Hafen und Handelsverhältnisse des Persischen Golfs und des Golfs von Oman. Nach dem Berichte des Generalkonsuls der Niederlande zu Buschehr, Baron R. C. Keun de Hoogerwoerd. 'Annalen der Hydrographie' Heft v. 1889.

Posewitz, (Dr.) Theodor.—Borneo. Entdeckungsreisen und Untersuchungen. Gegenwärtiger Stand der geologischen Kenntnisse. Verbreitung der nutzbaren Mineralien. Berlin, Friedländer, 1889: 8vo., pp. xxvii. and 335. Price 15s.

This is a highly useful work on Borneo. It begins with a well-arranged and copious bibliography. It gives a detailed account of exploration in Borneo, with a critical summary of the results of exploration. The second section of the work consists of a systematic account of the geology of the island, with a

sketch of its orography and hydrography. The third and longest section treats in great detail of the various useful minerals found in Borneo, with an account of the great mining enterprises that have been undertaken. For each section there is a special map.

Schumacher, Gottlieb.—Abila of the Decapoils. With original Plans, Illustrations, and a Map. [Palestine Exploration Fund. Quarterly Statement, July 1889.] 8vo., pp. 51.

Silvestre, J.—L'Empire d'Annam et le peuple Annamite. Aperçu sur la géographie, les productions, l'industrie, les mœurs et les coutumes de l'Annam, publié sous les auspices de l'Administration des colonies. Paris, F. Alcan, 1889: 12mo., pp. 380, map.

This is a good account of Annam as it was just before the French intervened.

Svoboda, [Dr.]—Die Nikobaren-Inseln und ihre Bewohner. Separatabdruck aus 'Mittheilungen der K. K. Geographischen Gesellschaft,' Heft 2 u. 3. Wien, E. Hölzel, 1889: 8vo., pp. 29, maps and plates. [Presented by the Author.]

AFRICA.

[Africa.]—Possedimenti e Protettorati Europei in Africa 1889. Raccolta di Notizie Geografiche, Storiche, Politiche e Militari sulle Regioni Costiere Africane. Roma, Voghera Carlo: 8vo., pp. viii. and 179. [Presented by the Publisher.]

This is a publication of the Italian General Staff, and is a very useful collection of facts, historical, geographical, commercial, and administrative, on the various countries of Africa. There are sketch maps of the various regions, mostly in the text.

Faidherbe [Le Général].—Le Sénégal. La France dans l'Afrique Occidentale. Paris, Hachette, 1889: 8vo., pp. 501. Price 7s. 6d.

Péroz, Étienne.—Au Soudan Français, Souvenirs de Guerre et de Mission. Paris, Lévy, 1889: 8vo., pp. 467. Price 5s. 8d.

Béchet, Eugène.—Cinq Ans de Séjour au Soudan Français. Paris, Plon, 1889: 8vo., 1 p. iii. and 270. Price 3s.

These works all deal with French Senegambia and the region extending to the Upper Niger. General Faidherbe's work is really a history of French connection with this part of the country, its aim being to show that it is quite worth keeping and spending money upon. In 1886-7 Captain Péroz was entrusted with a mission into the interior. He made his way up the Senegal river to the Upper Niger, and covered a considerable part of country, returning by a route more to the west. Mixed with military and other details are notes on the geography of the region traversed. M. Béchet's book is of a lighter kind. His five years were spent at Kita and in other parts of the Upper Senegal, and his book deals mainly with the everyday life of the people.

Guiral, Léon.—Le Congo Français, du Gabon à Brazzaville. Paris, Plon, 1889: 8vo., pp. xvi. and 322. Price 3s.

This is a narrative of the work accomplished by the late M. Guiral, partly in company with M. De Brazza. It includes the whole of the Ogowe and the region lying between that and Stanley Pool on the Congo. It is an addition to our knowledge of this region.

Martinière, H. M. P. [De La.]—Morocco. Journeys in the Kingdom of Fez and to the Court of Mulai Hassan, with Itineraries constructed by the Author, and a Bibliography of Morocco from 1844 to 1887. London, Whittaker & Co., 1889: 8vo., pp. xvi. and 478. Price 14s. [Presented by the Publishers.]

Mr. De La Martinière in 1884 and subsequently made some careful surveys and observations in Northern Morocco. The results of these are given in this volume, along with a number of very excellently compiled route maps with

views and sections. The author has added to his own observations information compiled from various sources. In the second chapter is a history of Tangiers; another chapter contains a history of Wazan; and another of Meknas. There is much also on the social and political condition of Morocco, so that the book abounds with useful information on various phases of life in that country. There is a preface by Colonel Trotter, in which he refers to Leared as a writer of "last century." There are very few dates in M. De La Martinière's book. The bibliography is most useful.

Philibert, [General].—*La Conquête Pacifique de l'Intérieur Africain; Nègres, Mussulmans et Chrétiens.* Paris, Leroux, 1889: 8vo., pp. 376. Price 9s. 6d.

General Philibert's work deals largely with Algeria and Tunis, the dangers which threaten them, the best means of developing them, and of uniting them by trade-routes with Central Africa. The Northern Sahara, its oases, its deserts, and its caravan routes are discussed. The various other routes into the interior, by Senegal, the Niger, the great Lakes, and the Nile are treated of in detail. Questions connected with colonisation, slavery, and other interesting points are discussed in an easy popular manner. The work contains much useful information, and reveals the aims of French policy in North Africa.

Rouire, [Dr.]—*La découverte du Bassin hydrographique de la Tunisie Centrale et l'emplacement de l'ancien Lac Triton (ancienne Mer intérieure d'Afrique).* Paris, Challamel Aîné, 1887: 8vo., pp. xix. and 186, maps. Price 4s.

This is a useful contribution to a knowledge of the hydrography and ancient geography of Tunis, its chief value being the information it contains regarding the site of the ancient Lake Triton.

AMERICA.

California.—State Mining Bureau. William Irelan, Jr., State Mineralogist. Eighth Annual Report of the State Mineralogist. For the year ending October 1, 1888. Sacramento, 1888: 8vo., pp. 948, map, chart, and illustrations.

[Eskimo.]—Eskimo of Hudson's Strait. By F. F. Paynes.—The Eskimo Race and Language. By A. F. Chamberlain. 'Proceedings of the Canadian Institute,' April 1889.

[Guatemala.]—Informe de la Direccion General de Estadistica. 1888. Guatemala, Tip. "La Unión": 8vo.

From the above work we learn that the population of Guatemala on the 1st of January, 1889, was 1,427,116, as compared with 1,394,233 at the same date of the previous year.

[Patagonia.]—Relacion de un Viaje a la Gobernacion del Chubut. Por Carlos V. Burmeister. Published as part of vol. iii. (pp. 175-252) of the 'Anales' of the National Museum of Buenos Ayres.

This is a record of an expedition to the Chubut region in Patagonia in 1887, in which important contributions were made to a knowledge of its geography as well as its natural history.

ARCTIC.

[International Polar Observations.]—Observations Internationales Polaires. Expédition Danoise. Observations faites à Godthaab. Avec un Appendice contenant: Observations météorologiques de la Dijnphua (Mer de Kara). Observations météorologiques et nautiques de Nennortalik et d'Angmagsalik. Publiées par l'Institut Météorologique de Danemark. Tome II.—II^e Livraison. Copenhague, G. E. C. Gad, 1889: 4to., maps and diagrams.

AUSTRALASIA.

[**Lord Howe Island.**—The Australian Museum, Sydney. Memoirs, No. 2. Lord Howe Island; its Zoology, Geology, and Physical Characters. Printed by order of the Trustees, E. P. Ramsay, Curator. Sydney, Charles Potter, 1889: 8vo., pp. 132. [Presented by the Trustees of the Australian Museum, Sydney.]

This important contribution to biological geography has a twofold object. It is intended in the first place to record the proceedings of a collecting party despatched by order of the Trustees to Lord Howe Island in August–September 1887, and to give descriptions of the specimens so obtained; and secondly, to give an epitome of the general zoology of the island, so far as it is at present known. The General Zoology is by R. Etheridge, junior; the Oology by A. J. North; Reptiles and Fishes by J. Douglas Ogilby; Insects by A. Sidney Olliff; Geology and Physical Structure by R. Etheridge; and notes on Rock Specimens by T. W. Edgeworth David. The island, biologically, seems more nearly related to New Zealand than to Australia. Mr. R. Etheridge's able sketch of the physical geography of the island is full of interest. There are a number of good maps and elevations, as well as illustrations.

[**New Zealand.**—Transactions and Proceedings of the New Zealand Institute, 1888. Vol. xxi. Edited and published under the authority of the Board of Governors of the Institute, by Sir James Hector, K.C.M.G., F.R.S., Director. Wellington, Didsbury; London, Trübner & Co., 1889: 8vo., pp. xxi. and 559. [Presented by the Director.]

Besides the papers under the sections of Botany, Zoology, and Geology of more or less geographical interest, there are several contributions in this volume to the geography of the New Zealand region. Mr. A. Reischek has some notes on the islands to the south of New Zealand. Mr. Reischek last year visited several of them, and the account which he gave of his observations will be useful, as we so seldom hear of these islands. Mr. Reischek's interests are mainly in the natural history and he gives very copious notes of the plants and birds observed and collected by him. From Stewart Island Mr. Reischek went on to the groups known as the Snares, 62 miles south-west of that Island. The northernmost island of this group, which is the largest, is little more than a mile in length by half a mile in breadth, and rises almost perpendicularly out of the sea to a height of 470 feet. It is volcanic in structure. The island is mostly covered with bush, the akeake (*Olearia* sp.) and kokomuka (*Veronica elliptica*) being the commonest trees. The soil is moist and largely mixed with guano. The whole surface is honeycombed with the numerous burrows of the petrels. The Auckland Islands, 150 miles south, were next visited. These consist of one large and several smaller islands, extending over a space of about 30 miles in length by about 15 in breadth. They are very hilly and broken, and well watered with many fine streams. The formation is partly granite and volcanic, and partly sedimentary. The lower portions are usually covered with bush, which consists mostly of mountain rata (*Metrosideros lucida*). Upon the hills the chief vegetation is the tussock grass, among which are a few flowering plants, the blue, red, and white veronicas being the most abundant. Campbell Island is 164 miles south-east of the Auckland Islands. It is about 10 miles from north to south, and 11 from east to west. Its geological formation is partly sedimentary and partly volcanic. It is very hilly, and the face of the hills is often dotted over with precipices. The greatest height is 1866 feet. The higher hills were (January 28) all snow-clad. Mr. Reischek then went on to the Antipodes Islands, 403 miles north-east of Campbell Island. The group consists of several detached rocks and islets, occupying a space of from four to five miles long by two broad. The largest island is about 1300 feet high, and some of the cliffs rise perpendicularly for 600 feet out of the ocean. Thousands of penguins of three species were standing as if glued to the rock. The vegetation consists of tussock grass, with some cotton plants, aniseed, and veronica. A ground-lark found on the largest island and two species of parakeets are entirely different from any birds found

on the mainland or on the surrounding islands, both in size, plumage, and habits. North-east of the Antipodes, 110 miles, are the Bounty Islands, a cluster of thirteen rocky islets covering a space $3\frac{1}{2}$ miles long by $1\frac{1}{2}$ mile broad. Mr. Reischek did not see any vegetation, but they are covered with millions of birds, mainly penguins.

The Rev. Archdeacon Williams contributes a paper on the visit of Captain Cook to Poverty Bay and Tolaga Bay, in which he gives the results of his careful investigation on the spot as to the particular locality visited by Cook and the occurrences which took place. The Archdeacon has been able by his investigations and inquiries to throw much light on what took place during the stay of the expedition in Poverty Bay. Mr. Taylor White contributes a short paper on the relics of Captain Cook's last voyage, and the same author gives some interesting reminiscences of his experiences in the Southern Alps. In a paper entitled Notes on the Waikato River-Basins, Mr. L. Cussen makes a contribution of some interest on the physical geography of a part of New Zealand. Mr. Edward Tregear's paper on the Knowledge of Cattle among the Ancient Polynesians, based on seemingly linguistic resemblances, cannot be considered of much scientific value.

In the geological section, Mr. James Park, F.G.S., contributes an alarming paper on the Extent and Duration of Workable Coal in New Zealand. He calculates that at the present ratio of increase of output New Zealand coal will be completely exhausted in the year 2053. The total quantity of available coal in New Zealand is, Mr. Park states, only equal to about five years' output of Great Britain; he estimates it at only a thousand million tons (including brown coal, pitch coal, and bituminous coal).

Romilly, Hugh Hastings [C.M.G.].—From My Verandah in New Guinea. Sketches and Traditions. With an Introduction by Andrew Lang, M.A. London, David Nutt, 1889: 8vo., pp. xxvi. and 277. Price 7s. 6d. [Presented by the Publisher.]

Those who have read Mr. Romilly's previous work on 'The Western Pacific and New Guinea,' will be glad to meet him again. His present work abounds with varied interest. Mr. Romilly has brought together the observations he has made in various directions during his many years' sojourn in New Guinea and its neighbourhood. His interest centres mainly in the humanity of the region, in the customs and folk-lore of the people, in the relations between natives and whites, and in the economical value of the Protectorate. As Mr. Lang shows in his introduction, Mr. Romilly's notes are of special ethnological interest, but there is also much that is of interest to the geographer. Many incidents are given of the daily life of the people. One chapter is devoted to native peculiarities, including the ethnical elements of the people and their social customs. In his own peculiar way Mr. Romilly deals in another chapter with the subject of headhunting and cannibalism. Sorcery, superstition, and fairy tales from the subjects of other chapters. Two chapters describe trips to the Laloki river, and to the eastward. Another chapter is devoted to the natives in the past and the present; and another to relations between natives and whites. The last chapter treats of the future of New Guinea, which Mr. Romilly is disposed to look upon hopefully. There is a good map of Eastern New Guinea and the islands lying off it.

OCEANIA.

Deschanel, Paul.—Les Intérêts Français dans l'Océan Pacifique. I.—Mission catholique des Gambier—Archipels des Tuamotus, des Marquises, Tubuai, Cook, Wallis—Ile Rapa, etc. II.—Les Nouvelles-Hébrides—Géographie—Histoire—Colonisation française—Libérés et récidivistes—Politique de l'Australie—Négociations anglo-françaises. Paris and Nancy, Berger-Levrault et Cie., 1888: 12mo., pp. vi. and 387.

[Hawaiian Islands.]—On the Volcanoes and Volcanic Phenomena of the Hawaiian Islands. By James D. Dana. With a Paper on the Petrography of the Islands.

By Edward S. Dana. 8vo., maps and illustrations. [Presented by James D. Dana.]

A collection of papers on the Hawaiian Islands from the 'American Journal of Science,' vols. xxxiii.-xxxvii., 1887-89. The volume is mainly occupied with a 'History of the Changes in the Mount Loa Craters, on Hawaii,' by James D. Dana; it also contains his paper "On the Origin of the Deep Troughs of the Oceanic Depression: are any of Volcanic Origin?"

GENERAL.

Baker, W. G.—Realistic Elementary Geography, taught by Picture and Plan, embracing direction, the elements of maps, definitions, &c. London, Blackie & Son, 1888. Price 1s. 9d. [Presented by the Publishers.]

The illustrations in this little work are well selected and likely to prove attractive and instructive to the young pupil. The text may prove suggestive to a competent teacher. The map between pp. 110 and 111 is not satisfactory.

Benko, Jerohm [Freiherr von.]—Reise S.M. Schiffes "Albatross" unter Commando des K. K. Fregatten-Kapitäns Arthur Müldner, nach Süd-Amerika, dem Caplande, und West-Afrika, 1885-1886. Pola, 1889. [Presented by the Publisher.]

Captain Benko has done for the voyage of the Austrian ship *Albatross* what he did for that of the *Zrinyi* noticed in the 'Proceedings,' 1888, p. 179. From the Mediterranean, the *Albatross* crossed the Atlantic to Pernambuco, touched at Bahia, Rio, Monte Video, and Buenos Ayres, crossed to the Cape, called at Mossamedes, Loanda, Banana, Sierra Leone, and Freetown. Each calling place furnishes Captain Benko with a text for a very thorough examination into the geographical, social, political, and commercial condition of the country of which it is the centre. Thus, besides the usual nautical observations (embodied in the chart), we have highly instructive observations on many places of great interest, including English colonies, by a cultured and intelligent foreigner.

Clarke, C. B. [F.R.S.]—A Class-Book of Geography. [Revised edition.] London, Macmillan & Co., 1889: 12mo., pp. xi. and 302. Price 3s. 6d. [Presented by the Publishers.]

The present edition has been revised and brought up to date, for the author, by the Rev. G. E. Mackie, head-master of the Godolphin school. The principal alterations are: (1) the putting in newer numbers for the population of towns; (2) the bringing up to date of the political geography of Egypt, Turkey, &c.; (3) the mention of a few places, as Baku, which have lately become of importance; (4) the addition of an Appendix, intended to indicate what is meant by astronomic geography and chartography. The volume is illustrated with eighteen coloured maps.

Dictionary of National Biography.—Edited by Leslie Stephen. Vol. xviii., Esdaile—Finan; vol. xix., Finch—Forman. London, Smith, Elder & Co., 1889: 8vo., pp. (vol. xviii.) vi. and 448; (vol. xix.) vi. and 447. Price (each volume) 15s.

Among the notices in vol. xviii. may be mentioned the following names, more or less connected with geography:—Sir George Everest, by G. C. Boase; Sir Vincent Eyre, by H. G. Keene, c.r.e.; Thomas Falkner, by C. W. Sutton; Sir Charles Fellows, by G. C. Boase; Edward Fenton, by C. H. Coote.

In vol. xix.—Alexander George Findlay, by G. Barnett Smith; George Finlayson, by J. M. Bigg; William Fisher, by Prof. J. K. Laughton; Ralph Fitch, by C. H. Coote; Robert Fitzroy, by Prof. J. K. Laughton; Matthew Flinders, by the same; Edward Forbes, by G. T. Bettany; J. D. Forbes, by G. Barnett Smith.

Fabre, Friedrich.—Bedarf Deutschland der Colonien? 3te Ausgabe. Gotha, 1881: 8vo., pp. viii. and 108. Price 1s. 2d.

—— Fünf Jahre Deutscher Kolonialpolitik. Rück- und Ausblicke. Same publisher, pp. xv. and 153. Price 2s. 6d.

The first of these volumes gave a great impulse to German colonial enterprise; the second is an instructive record of the past and forecast of the future.

Faure, C.—Les Progrès de l'Enseignement de la Géographie en Angleterre sous l'impulsion des Sociétés de Londres, d'Edimbourg et de Manchester. Extrait du *Globe*, t. xxviii.—juin, 1889. Genève, R. Barkhardt, 1889: 8vo., pp. 45. [Presented by the Author.]

This is a very complete and appreciative résumé of what the Society has done for the improvement and extension of geographical education in this country.

Fisher, [Rev.] Osmond.—Physics of the Earth's Crust. Second edition. Altered and enlarged. London, Macmillan & Co., 1889: 8vo., pp. xvi. and 391. Price 12s. [Presented by the Publisher.]

Mr. Fisher has issued a second edition of his most suggestive work, he tells us, because possible explanations of some of the difficulties left unsolved in the first edition have occurred to him. Investigations have also been carried on by others, which appear to strengthen and support some of the conclusions already arrived at. A great part of the book has been rewritten; there are many additions and some omissions. There are many chapters in this work that will interest the physical geographer, who will probably hesitate to accept Mr. Fisher's theory of the origin of oceanic basins.

Geographisches Jahrbuch.—XIII. Band, 1889. Herausgegeben von Hermann Wagner. Gotha, Justus Perthes, 1889: 8vo., pp. viii. and 476.

The new volume of this valuable yearbook contains as usual a number of elaborate memoirs of great importance on scientific geography. The progress of Geophysics is treated of by Dr. H. Hergesell and Dr. E. Rudolph; the development and present position of research in Terrestrial Magnetism, by Professor Karl Schering; new observations on the Geognostic Structure of the Earth's Surface, by Dr. Franz Toula; the progress of Oceanography, by Dr. O. Krümmel; report on the progress of Geographical Meteorology, by Dr. Julius Haun; report of the progress of Geographical Botany, by Dr. O. Drude; report on the progress of our knowledge of the Distribution of Animals, by Dr. L. K. Schmarda; report on Ethnological Research, by Dr. G. Gerland.

[German Colonies.]—Die deutsche Kolonialpolitik. [1.] Jahrbuch der deutschen Kolonialpolitik. 2. Band, 1888. Leipzig, Rengersche Buchhandlung, 1888, 1889: 8vo. Price 13s.

The second volume of this work is a continuation of the first, which consists mainly of a collection of official documents relating to German colonial enterprise in various parts of the world.

Monaco, [Prince] Albert de.—Sur les courants superficiels de l'Atlantique Nord. [Paris, Gauthier-Villars et Fils, 1889]: 4to., pp. 4.

Seton-Karr, H. W.—Ten Years' Wild Sport in Foreign Lands; or, Travels in the Eighties. London, Chapman & Hall, 1889: 8vo., pp. [viii.] and 333. Price 9s. [Presented by the Publishers.]

Mr. Seton-Karr says in his preface that exploration or adventure included in the volume will at least serve the purpose of comparing the different countries described from a sporting point of view, from the fact of their having been the experience of a single individual, within the short period of a decade, and partly

in the intervals of military service, which included a campaign. This purpose the volume may very well serve. Several of the chapters relate to Norway, Sweden, and Lapland, so that in them we cannot expect much that is new from a geographical point of view. Others again relate to such out-of-the-way places as Sardinia and Corsica, Mount Athos and Alaska. Mr. Seton-Karr has also been in the Rockies, in British Columbia, in Kashmir, in Persia, as well as India. His book by no means deals exclusively with sport; it contains many observations on the countries and the peoples through which he wandered, so that it is often instructive as well as entertaining.

The World.]—Die Erde in Karten und Bildern. Hand-Atlas in 63 Karten nebst 125 Bogen Text, mit 1000 Illustrationen. Herausgegeben unter Mitwirkung hervorragender Fachmänner von der Verlagshandlung. Wien, Hartleben, 1889: Folio, pp. viii, and 494. Price 50s.

This is one of those magnificent geographical works for which a market seems to be found more readily on the Continent than with us. It is a popular and systematic description of the countries of the world in their various geographical aspects, with a brief general introduction. The compilation seems carefully and accurately done; the 1000 illustrations, showing a vast variety of features, are beautifully executed, while the numerous maps are clear and creditable specimens of cartography.

The following works have also been added to the Library:—

[The Holy Land.]—Theatrum Terræ Sanctæ et Biblicarum Historiarum cum tabulis geographicis ære expressis. Auctore, Christiano Adrichomio, Delpho. Folio, pp. 286, maps and plates. [1600.]

Campbell, F. A.—A Year in the New Hebrides, Loyalty Islands, and New Caledonia. With an Account of the Early History of the New Hebrides Missions, by A. J. Campbell, Geelong; a Narrative of the Voyages of the "Dayspring," by D. McDonald, D.D.; and An Appendix, containing a contribution to the Phytophraphy of the New Hebrides, by Baron von Mueller, C.M.G., M.D., F.R.S., F.R.A. Geelong, G. Mercer; Melbourne, G. Robertson, sm. 8vo., pp. xii., 224, and 30 plates. [Presented by the Author.]

[Instructions for Travellers.]—Useful Instructions for Travellers; a Dissertation on the most common Accidents that may happen in Travelling, with the means to be used for preventing them. By an Experienced Traveller. London, 1793: 8vo., pp. 24.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

THE WORLD.

Globe.—Ballon Géographique. Th. Al. Decker, Luxembourg. Institut National de Géographie. Bruxelles.

The globe is composed of two principal parts, an inner globular bag of india-rubber, and an outer covering of calico, on which a map of the world is printed. These are inflated by blowing into a mouthpiece which is attached for that purpose, and when not required for use the air is allowed to escape, and the globe can be folded up and carried in the pocket. It must, however, be remarked that no one but a person with strong lungs could inflate this

globe sufficiently, and that when this is properly done, it is likely to split, as indeed was the case, at the first trial, with one that was presented to the Society.

World.—The —, on the Projection of Colonel A. C. Hamilton, n.e. Lithographed by W. Griggs, London. 1889.

—, on the Projection of Colonel A. C. Hamilton, n.e. Showing the Distribution of Animals in Zoogeographical Regions, after A. R. Wallace. Lithographed by W. Griggs, London. 1889.

These maps are drawn on an ingenious projection by which the whole land-area of the world is shown on a plane surface, with comparatively little distortion.

EUROPE.

Alpen-Länder.—Uebersichts-Karte der —, bearbeitet von Vincenz von Haardt. Scale 1:1,000,000 or 13·6 geographical miles to an inch. 2 sheets. Wien, Eduard Hölzel. Price 3s. (*Dulau.*)

Belgique, Carte de la —. Institut National de Géographie, Bruxelles. Scale 1:500,000 or 6·8 geographical miles to an inch. Cartes Inaltérables—Brevet Belge, No. 4550-84287. Exposition de la Société Internationale pour la propagation de la Science de Géographie.

This map is printed on waterproof sheeting, and cannot therefore be affected by exposure to wet. Several maps of this description have been published in England, but do not appear to have found favour with explorers or the public.

Croatien und Slavonien.—General-Karte von —, von M. Katzenschlager. Scale 1:504,000 or 5·8 geographical miles to an inch. 2 sheets. Wien. Price 4s. (*Dulau.*)

Deutschen-Reiches.—Karte des —. Scale 1:100,000 or 1·3 geographical miles to an inch. Sheets:—589, Pforzheim; 643, Ensisheim; 655, Altkirch. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme. Sheets:—389, Halle. 392, Grossenhain. Herausgegeben vom topogr. Bureau des Königl. Sächsa. Generalstabes. Price 1s. 6d. each sheet. (*Dulau.*)

Eastern Alps.—Karte der Bairischen und Algäuer Alpen (Karte der Ost-Alpen in 9 Blättern, Blatt I). Scale 1:250,000 or 3·4 geographical miles to an inch. Von Ludwig Ravenstein. Frankfort a/Main. Price 6s. (*Dulau.*)

— Karte der Salzburger-Alpen, und des Salzkammerguts. (Karte der Ost-Alpen in 9 Blättern, Blatt II). Scale 1:250,000 or 3·4 geographical miles to an inch. Von Ludwig Ravenstein. Frankfort a/Main. Price 6s. (*Dulau.*)

This excellent map of the Eastern Alps is now approaching completion, six sheets of it having already been published, and the remaining two are promised for next year. All the sheets of this map are orographically coloured, the heights are given in metres, the size and importance of towns are distinguished by symbols, and taken altogether, they are beautiful specimens of cartography.

France.—Carte géologique de la —. à l'échelle 1,000,000^e exécutée en utilisant les documents publiés par le Service de la carte géologique détaillée de la France à l'échelle 80,000. 4 sheets. Paris, Baudry et Cie. Price 9s. (*Dulau.*)

Nederlanden.—Kaart van het Koninkrijk der —, van Dr. J. Dornseiffen. Scale 1:425,000 or 5·8 geographical miles to an inch. Amsterdam, Seyffardt. 2 Blatt. Price 2s. (*Dulau.*)

Piacenza.—Carta topografica della Provincia di —, nel formato di 70 × 80 alla scala di 1:1,000,000 or 1·3 geographical miles to an inch. Piacenza, Vincenzo Portu. Price 3s. (*Dulau.*)

Switzerland.—Karte des Kantons Graubünden. Ziegler. Zürich, Wurster & Co. Price 2s. (*Dulau.*)

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ENGLAND AND WALES: Birmingham, VIII. 14, 23; XIII. 4, 3, 13, 16, 20, 23, 24, 25; XIV. 1, 1, 3, 4, 8, 9, 11, 12, 15, 16, 17; XIV. 2, 6, 12, 13, 17, 21, 22; XIV. 5, 1, 7; LXVIII. 16, 20; LXVIII. 16, 19; 2s. 6d. each. Llandudno, II. 18, 23; 2s. 6d. each.

(*Stanford, Agent.*)

ASIA.

Syria and Palestine.—Map of —, lithographed at the American Press. Beirut, 1889. Scale 1:557,500 or 7·6 geographical miles to an inch.

This very interesting, though somewhat roughly drawn map, has been produced by the American Press at Beirut; the lettering is in Arabic. In Northern Syria, between Tripoli on the south, and Antioch and Aleppo on the north and east, the positions and names of several villages are given which have not previously been indicated on maps of this region. An inset map and a section are also given.

AFRICA.

Africa.—Karte der verschiedenen Elfenbein-Arten und Handelsgebiete von Paul Reichard. Deutsche Geograph. Blätter. Band XII., Tafel 4. Kommissionsverlag von G. A. v. Halem in Bremen. (*Dulau.*)

Congo.—Carte de l'État Indépendant du — dressée par A. J. Wanters. Scale 1:7,000,000 or 93·6 geographical miles to an inch. Institut National de Géographie, Bruxelles. Cartes Inaltérables—Brevet Belge, No. 4550-84287. Exposition de la Société Internationale pour la propagation de la Science de Géographie.

Guiné Portugueza.—Carta da —, 1889. Scale 1:500,000 or 6·8 geographical miles to an inch. Ministerio da Marinha. Comissão de Cartographia. Lisbon. (*Dulau.*)

This is a clearly drawn map of the Portuguese possessions in Guinea. It includes the coast-line from lat. 10° 30' N. to 130° N., and extends into the interior as far as 130° 20' W. longitude. The positions of shoals in the rivers and bays are indicated, but as no soundings are given, this map, which in other respects more nearly resembles a marine chart, would be of little service to mariners.

AMERICA.

Nicaragua-Schiff-Kanals.—Plan und Längen-Profil des —. Deutsche Geographische Blätter. Band II., Tafel 2. Kommissionsverlag von G. A. v. Halem in Bremen. (*Dulau.*)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in May and June, 1889.

No.	m	=	Inches.	
2380	m	=	0·65	Black Sea;—Southern approach to Kherson Bay, 2s.
1266	m	=	0·12	West Indies:—Islands and banks between San Salvador and San Domingo, 3s. 6d.
1325	m	=	1·7	South America, west coast:—Gulf of Peñas to the Guaytecas islands, 2s. 6d.
824	m	=	0·26	Bay of Bengal, east coast:—White point to Mergui, 2s. 6d.
1293	m	=	0·58	Celóbes:—Approach to Makassar, 2s. 6d.
1316	m	=	0·18	Korea, east coast:—Cape Duroch to Linden point, 2s. 6d.
1271	m	=	various.	Korea, east coast:—Fontina point to Linden point, including Kormilof gulf, and Egberman and Anna bays, Sivutoh, Tizenko, and Stepanof bays, Pallada roadstead, Ostolopof bay, Sin Shian bay, 2s.
2803	m	=	4·0	Australia, east coast:—Port Denison, 2s. 6d.
960	m	=	0·68	Tasmania:—Approaches to Hobart, including D'Entrecasteaux channel and Derwent river, 3s.
1339	m	=	1·45	Samoa or Navigator islands:—North coast of Upolu between Falifa harbour and Falulu point, 1s.
1134	Magdalen islands:—Plan added, Amherst harbour.			
868	Ports and anchorages on west coast of central America:—Plans added, El Rincon harbour. Golfito anchorage. Approaches to San Domingo.			
2089	Tugela river to Delagoa bay:—Plan added, Sordwana road.			
1730	Samoa or Navigator islands:—New plan, Apia harbour.			

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.	Cancelled by	No.
2380 Dniepr or Kherson bay and Dniepr river	New plan, southern approach to Kherson bay	2380
1143 Amherst harbour	New plan, Amherst harbour on	1134
1325 Gulf of Peñas to the Guaytccas islands	New chart, Gulf of Peñas to the Guaytccas islands	1325
824 White point to Mergui	New chart, White point to Mergui	824
2803 Port Denison	New plan, Port Denison	2803
1079 Plan on this chart, approaches to Derwent river and Hobart .. .	New chart, Approaches to Hobart	960
2856 Brozos river entrance.		
1967 Pantai and Bulungan rivers.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 2682. England, west coast:—Nash point to New Passage. 2484. England, river Thames:—London to Gravesend. 2499. Ireland, north coast:—Lough Foyle. 2114. Baltic entrance:—The Kattegat. 2360. Baltic Sea:—Cape Falsterbø to Kalmar sound. 2223. Baltic Sea:—Carlskrona harbour. 2302. Baltic Sea:—Tome point round the head of the Gulf of Tauvo. 2300. Baltic Sea:—Stiernö point to Fiäderig and Stor Fiärd to Gamla Karleby. 2623. Maltese islands:—Comino channels. 233. Mediterranean Sea:—Suez canal. 268. North America, east coast:—Cape Fear to Sapelo sound. 2899. Gulf of Mexico:—St. Andrew bay. 1843. Africa, south coast:—Buffalo river. 1809. Africa, east coast:—Mozambique harbour to Ras Pekawi. 734. Red Sea:—Suez bay. 212. Sumatra, west coast:—Padang road. 934. Eastern Archipelago:—Sourabaya, Bali, and Sapudi straits, &c. 2636. Eastern Archipelago:—Makassar strait. 943. Philippine islands:—Philippine islands and adjacent seas from Molucca passage to Manila. 54. Korea:—Port Lazaref. Shin-Po anchorage, &c. 2875. Japan:—Seto-uchi or Inland sea. 2432. Korea:—Tumen Ula to Strelok bay. 1056. Australia, west coast:—Cape Cuvier to Champion bay. 1750. Australia, south coast:—Port Adelaide.

(J. D. Potter, Agent.)

United States Charts.—Great Circle Sailing Chart of the South Pacific Ocean.—No. 1149. West Coast of Lower California. San Diego to San Quentin bay. Surveyed by the Officers of the u.s.s. *Ranger* in 1885–86, Commander C. E. Clark, u.s.n., Commanding. Pilot Chart of the North Atlantic Ocean. July, 1889. Published at the Hydrographic Office, Navy Department, Washington, D.C. G. L. Dyer, Lieut., u.s.n., Hydrographer to the Bureau of Navigation.

ATLASES.

India.—An Atlas of Twelve Maps of —, illustrating the Mountain and River Systems, the Irrigation, Civil Divisions, Population and Languages, Railways, Roads, Telegraphs, Post Offices, Ports, &c., Military Commands and Posts, Famines, Meteorology, Crops, Forests, and One-inch Surveys. Accompanied with Tables and Notes. By Trelawney Saunders, F.R.G.S., Geographical Assistant at the India Office (retired). London, Edward Stanford, 1889. Price 3*l.* 3*s.*

The maps contained in this atlas were prepared by Mr. Trelawney Saunders, when Geographical Assistant at the India Office, to accompany the second

decennial report on the moral and material progress and condition of India, and were issued as part of a Parliamentary paper in 1885. Permission has now been granted to the publishers to use the plates and stones in the production of the present edition in the form of an atlas, with some notes and additions by the author. The present issue is limited to 250 copies, and, as the maps have been rubbed off the stones and will not be reprinted, those who are desirous of obtaining copies of this valuable atlas should lose no time in communicating with the publisher.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von ——. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Dreizehnte (13) Lieferung. Inhalt: Nr. 32, Spanien und Portugal, Übersicht, 1:3,700,000 von C. Vogel. Nr. 44, Ost-Europa, Bl. 1: Norwegen, N. Schweden und Finnland, von. A. Petermann. Nr. 89, Süd-Amerika, 1:25,000,000 von H. Habenicht und H. Salzmann. Gotha, Justus Perthes, 1889. Price 1s. 6d. each part. (*Dulau.*)

Sheet No. 32 is a general map of the Spanish Peninsula, and which also contains an inset plan of the river Tagus from its mouth to a short distance east of Lisbon. Sheet 44 contains the whole of Norway, the northern portion of Sweden, and parts of Russian Lapland and Finland. Sheet 89 is a general political map of South America on which the altitudes of several prominent peaks are given in metres, the depth of the ocean up to 5000 metres being also indicated by a series of contour lines and different shades of blue.

PHOTOGRAPHS.

Alps.—Eight Photographs of the — (Dauphiné, Monte Rosa, Weisshorn, &c.), taken by Sig. Vittorio Sella, and presented by him to the Royal Geographical Society.

Burma.—Sixty-eight Photographs taken in Upper —, by Captain G. H. H. Couchman, and presented by him to the Royal Geographical Society.





PROCEEDINGS
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AND MONTHLY RECORD OF GEOGRAPHY.

*New Guinea: Narrative of an Exploring Expedition to the Louisiade
and D'Entrecasteaux Islands.*

By BASIL H. THOMSON, Esq.

(Read at the Evening Meeting, July 8th, 1889.)

Map, p. 580.

THE object of this paper is to give some account of an exploring expedition to the various islands of the Louisiade and D'Entrecasteaux Archipelagoes, which are now included in the possession of British New Guinea.

It is not within the scope of this paper to give an outline of the history of New Guinea during the last few years. It is enough to say that since the year 1884 the Protectorate was administered by a Commissioner, and that, owing to the undefined nature of his executive and judicial powers, and the probability that an influx of Europeans would result in hostilities with the natives, settlement by Europeans was discouraged. New Guinea was last year declared a British possession by Royal Letters Patent, and the flag finally hoisted at Port Moresby on September 4th.

During the Protectorate a number of persons had, either on their own account, or on behalf of some scientific body, made expeditions to the mainland, and had made large claims for concessions of land as a reward for their services in explorations, the nature and extent of which it is impossible to verify. A belief had, however, grown in Australia that New Guinea would prove rich in gold, and there was a danger that small parties of prospecting miners would, in visiting places hitherto untrodden by white men, provoke hostilities with the natives. Indeed, just before the hoisting of the flag, gold had actually been discovered in the island of Sudest, and hundreds of miners were flocking to an island which, though it was under the Government of British New Guinea, was as yet unprovided with a single policeman, or other representative of law and order. As miners who were disappointed in Sudest were sure to wander off to the other islands of the Louisiade Archipelago in

search of gold, it was deemed advisable at once to make an official expedition, partly to ascertain the real capabilities of the islands, and also to reassure and explain the new state of things to natives, many of whom had never before seen a white man.

We left Port Moresby, the seat of Government, on September the 20th, and traversed the first seventy miles on horseback in order to visit the villages of the Motu, Sarea, and Loyalupu tribes. The coast villages of these tribes are usually built on piles in the shallow water between the coral reef and the shore, from which they are a quarter to half a mile distant. The original motive for this was doubtless to guard against surprise by enemies. The houses are much crowded together, and rock perceptibly in a strong wind, but as New Guinea is outside the hurricane belt they are more subject to destruction by fire than by storms. The piles are short lived, being attacked by marine borers, but when a house becomes rickety new piles are inserted beside the old ones without disturbing the building. In form they are oblong, thatched with grass, floored with rough planks, and devoid of even the mats in use among nearly all the Pacific Islanders. The interior is usually littered with nets, pots, and the utensils of daily life.

The first thirty miles of country consists of low hills covered with grass and sparsely timbered with dwarf eucalyptus. Between the hills and along the creek beds were belts of good alluvial soil, but the country suffers much from drought during the dry season. Except along the coast-line this district is very sparsely populated. Some forty miles from Port Moresby the character of the country changes into a bolder and more broken formation of limestone hills covered only with coarse grass, and with belts of large timber on the watercourses. Some ten miles inland, the Astrolabe range, densely timbered, rises like a wall to a height of 4000 feet.

This grass country swarms with wallaby of two species, the other quadrupeds being an opossum and a bandicoot, all of which are marsupial. Besides the numerous birds of the parrot and crow orders, there are great numbers of the *Megapodius tumulus* or scrub hen, whose great mound-nests, some of them more than 10 feet in height, furnish the natives with animal food during the egg season. I may mention that these mounds are not the work of a single bird but the result of the labour of a number, who lay there for several years in succession. The natives assert that the brush turkey, a larger species of megapodius, lays its eggs in the same mound as the scrub hen.

The coast villages of the first thirty miles are inhabited by the Motu tribe, a maritime people who came from the westward, and settled by permission on lands belonging to the Koitabu; some of the latter are to be found in every Motu village. They are typical Papuans, having the crisp, frizzy hair, prominent nose, and fine chin, so well described by Wallace in the case of the Ké Islanders. They are the

great navigators and traders of New Guinea. Once a year, about September, they sail westward some 200 miles to obtain sago in exchange for pottery. Their craft, composed of some eight or nine canoes lashed side by side, and propelled by two sails shaped like the claws of a crab, are so unwieldy as to be unmanageable against a head wind; and they have therefore to wait for the north-west monsoon before they can return. Each of these trading canoes (*lakatoi*) is capable of carrying four tons of sago. It is characteristic of the unprogressive conservatism of the Papuan, that though sago is procurable only a few miles distant, they, because their forefathers, owing to a state of war or other reason, had to sail 200 miles for sago, continue to undertake this dangerous annual voyage, and to neglect the nearer food supply from which the obstacle has been long since removed.

Their food consists principally of yams, taro, plantains, sago, and sugar-cane, to which fish, pork, and wallaby are occasionally added. In times of scarcity they are driven to eat forest nuts of various kinds, and even the fruit of a *Cyead*. The men are naked, save for a perineal band of fibre no thicker than a piece of twine. The women wear a grass petticoat from the waist to the knees, open at one side. Wives are acquired by purchase, though, owing probably to the influence of the Mission, mutual attachment is now sometimes considered. Polygamy is allowed. The population is healthy, fever in a mild form being apparently the only endemic disease, but perhaps one-quarter of the people suffer from the loathsome ailment, *Tinea desquamans*, a malignant ring-worm that is supposed to have been derived from the Line Islands, and to have reached New Guinea by way of Fiji, the Solomon Islands, and New Britain. Though it is disgusting in appearance, and disagreeable to the patient, it does not incapacitate him in any way, and therefore no effort is made to be rid of it. Except the pig and the dingo, the natives have no domestic animals. The dead are often buried beneath the houses in the inland villages. The people show much domestic affliction, and great grief at the loss of relatives or friends, but their sorrow, like that of children, is short-lived in proportion to its poignancy.

The Motu language, which is spoken by some 5000, and understood by perhaps four times that number, is from a Papuan root, but contains several Polynesian words. The absence of consonant terminations gives it a soft and fluent character. In syntax and idiom it is precisely similar to the other Melanesian languages, and it shares with the Polynesian dialects the complicated system of possessive pronouns. The language has been reduced to writing by the missionaries, who are now teaching it in all their schools. In the last thirty miles of our journey, however, we found in villages, not ten miles apart, variations in dialect so great as almost to amount to different languages.

The whole of this district has been for several years under the influ-

ence of the London Missionary Society, whose teachers reside at all the principal villages. They are natives of Tahiti, Rarotonga, and Niué, and have exchanged the comfort of semi-civilisation for a life of great hardship and even danger. We visited five of the stations. Some hymns were sung in good time and tune, music being a passion with the natives, but very few were able to read, and scarcely any to write. Moreover, the missionaries appear to have acquired little or no influence over the adult natives, and as a result they have no power to avert intertribal wars, which are continually taking place in a desultory fashion. The contrast between the success of the Mission here and in Tonga and Fiji is strikingly marked. In the latter, young and old embraced Christianity with enthusiasm; the teachers were supplied gratis with houses and food, and the Missionaries soon wielded the executive power in the land, a power which they are only just beginning to lose. In New Guinea, on the contrary, every day's labour given to the Mission, every yam eaten by the teacher, must be faithfully paid for; in fact, the success of the Mission in many places is in proportion to the amount of tobacco distributed. I do not ascribe this want of success to the Mission system, but to the character of the natives themselves. They are devoid of religious enthusiasm, and tolerate religious services partly from their love of music, and partly for the material gain they hope to derive from the Mission. Judging from the constantly recurring outrages and petty intertribal feuds in the districts longest under Mission influence, it is safe to predict that if these people are ever to be softened and civilised, it will not be by the spread of Christianity, but from the fear of punishment by the arm of the law. Their wars are due to one of three causes. When a tribe becomes so strong as to be a standing menace to its neighbours, the latter combine and destroy it, killing all the women, lest they breed avengers in the future; to take vengeance for some outrage or insult; or because the sudden death of some member of the tribe is ascribed to the witchcraft of an enemy, for no death is believed in New Guinea to result from natural causes. But all these reasons are really excuses for head-hunting. Until a man can wear the upper mandible of the hornbill imbedded in his hair, a distinction only allowed to those who have killed their man, he enjoys no consideration in the tribe. A youth of fifteen years old was pointed out to us thus decorated. His father had wounded and disarmed a man, and held him fast, while this young ruffian despatched him with a club. Another boy had just assumed the hornbill for having stolen unawares upon a defenceless woman and speared her in the back. A life may, however, be paid for, and in one case a hatchet, two pigs, and some spears were taken as payment for the life of a young man.

My excuse for having been thus diffuse about a country and people already known to geography, is that they are so nearly allied to the people I am about to describe that they afford a fair indication of what

we may expect from the people of the Louisiades and D'Entrecasteaux when they have been brought into contact with Europeans.

At Kerepunu we embarked in the Government schooner *Hygeia*, and after a voyage of ten days against head winds dropped anchor at Sudest Island on October 4th, having called at several small islands on the way. Sudest, the largest of the Louisiades, is 45 miles long and varies from 10 to 4 miles in breadth. It is of a slaty formation, with veins of crystalline quartz running through it in all directions. The eastern portion is mountainous, the highest point, Mount Rattlesnake, being about 3000 feet high. The higher parts are densely timbered, but the low hills near the sea are covered with grass, whose bright green offers a welcome contrast to the sombre tropical forest. We found some 400 miners already at work, and others were arriving almost daily from Cooktown. The gold, which was much waterworn, was found scattered along the creek beds, among the gravel and sand which had washed into the interstices of the slate. It was deposited so unevenly and capriciously that experienced miners had no advantage over novices, and the most diligent search had failed to discover the reefs from which the alluvial gold must have been washed down.

The island was very sparsely inhabited, and the natives have for years been the prey of the head-hunting parties of the more warlike Brooker Islanders. They are in all respects so like their neighbours of Rossel Island, that one description will serve for both.

On October 9th we sailed for Rossel in H.M.S. *Swinger*, having the *Hygeia* in tow. Twenty miners accompanied us to prospect for gold. The island is surrounded by a distant barrier reef of irregular form, terminating in a most dangerous point on the south-east end known as Rossel Spit. Being unsurveyed, it has been the scene of numerous wrecks. I quote from the 'Sailing Directions' an account of one of them:—"On the 30th September, 1858, the ship *St. Paul*, bound from Hong Kong to Sydney, with 327 Chinese passengers on board, was totally wrecked on this island, when all hands reached the shore. The captain and eight of the crew then left in a boat to obtain assistance, and on the French steamer *Styx* arriving at the spot from New Caledonia early in January 1859, it was found that the whole of the passengers and the remainder of the crew, with the exception of one Chinese, had been horribly massacred by the natives. The survivor stated that the natives feasted upon the bodies of their victims." It is not surprising that Rossel has since enjoyed a reputation for mystery and danger, to which, perhaps, its dangerous unsurveyed reefs and sombre forests have not a little contributed.

After communicating with the natives of an outlying island (called High Island), from whom we took a boy who had learned a little "pidgin" English on a Queensland plantation, we steamed into Dixon Bay, a deep indentation on the west side extending almost to the foot

of Mount Rossel. Here the *Swinger* left us, and returned to Australia. Upon our announcing our intention of crossing the island, our interpreter flatly refused to accompany us, saying that the people of the interior were cannibals, that they would kill us all, and that even if we escaped they were certain to come down and kill and eat him after our departure. He shortly afterwards slipped unobserved into a canoe, and we never saw him again. Nor were we more successful in engaging carriers. The natives of the small village opposite to which we were anchored were extremely suspicious, and could not be induced to accompany us eastward.

On October 12th we started, a party of seven, with five days' provisions, each man carrying some 25 lbs. besides his arms. We landed at the bottom of Dixon Bay, where we joined the party of twenty miners. Heavy rain came on, however, and continuing all day, necessarily impeded our journey through the forest, and towards evening we were obliged to descend 1000 feet to a deserted village for shelter and water. The following day was devoted to collecting in the swampy forest surrounding the village. Much of the timber is very fine, and we noticed several trees rich in gum, resin, and rubber, the latter exuding freely from a ficus closely allied to the fig-tree so common in Queensland (*Ficus Cunninghami*). Rossel proved a very rich field for the botanist, and was especially rich in orchids. Unfortunately, however, many of the specimens arrived in Melbourne too much damaged for classification, owing to the difficulty of properly drying them, and our being unprovided with spirits for botanical purposes.

On the following morning we ascended the main range of the island. Even at an elevation of 8000 feet we found a network of native tracks either following the crests of the ridges or branching off at right angles into the valleys. These numerous paths, out of all proportion to the population of the island, are probably made in hunting wild pigs which swarm in the forest. Steering by compass, we at length found a track leading in the right direction. Steadily descending, it widened into a road a chain wide. This road had been evidently cleared long ago, for the stumps of the trees cut down had decayed away, and the undergrowth was kept carefully weeded. Expecting that this led to some large and populous town, we were not a little surprised to find ourselves in a tiny village naturally fortified. The fires were still alight, and there was every indication that the inhabitants had just left. Below the village there was an extensive taro plantation on the banks of a stream, from which we helped ourselves, leaving tobacco in payment, and, as our hosts did not reappear, we passed the night in their village.

As this was a good example of the Rossel villages, it merits a few words of description. The houses were nine or ten in number, built in irregular form, some three or four yards apart; but two houses, perhaps those of the elders or chiefs, were built on higher ground, on which

were some rough stone seats which we afterwards learned were used as the village "forum." The houses, unlike those of the neighbouring islands, were shaped like an inverted boat, resting on a platform some five feet from the ground, and the roof of pandanus thatch allowing no door at either end, the interior was reached through two trap-doors in the floor. Each of the six posts supporting the platform was surmounted by a disc of wood 18 inches in diameter to prevent rats from climbing into the thatch. The interior of the houses was littered with earthen pots, baskets containing food, and the few tools with which a New Guinean is equipped to fight against nature. It is floored with the split stems of the slender "balaka" palm. The ground on which the village stands is kept scrupulously swept, and is floored with coarse gravel; and cooking, by means of earthenware pots supported on a triangle of stones, is carried on beneath the houses. Under the eaves of the largest dwelling-house are usually one or two skulls on a shelf, and a heap of human bones mixed with those of the dugong, turtle, and large fish are to be found piled up in some corner of the village. In every house we found bundles of spears suspended beneath the overhanging eaves, ready to be snatched up at an alarm. They were formed of the outer rind of a palm, and were generally without barbs. There were also a large quantity of adzes, the handles rudely fashioned and attached by sinnet to a blade formed from an iron chain-plate, bolt, or even a 5-inch nail. In one house we found iron utensils, evidently belonging to a ship, nearly new and with traces of having been used to cook taro in; and in a neighbouring village was a rude model of the hull of a ship—plunder from a German schooner wrecked there a few months previous to our visit. This, together with the bones of fish and other marine animals, served to show that these inland people have constant communication with the south-east coast.

Before starting next morning we paid a visit to a neighbouring village in which tobacco had been deposited by us overnight. Turning a corner among high grass, we came suddenly on eight or nine men unarmed, and carrying coco-nuts which were perhaps intended as a return gift for the tobacco. Startled by the sudden apparition of so strange a being as a white man, they all took to their heels regardless of our cries of "Gemba" (peace), and "Egu mamu nugo" (come here). They were shorter and darker in colour than the coast people, but they wore the same scanty dress.

After passing through several villages deserted at our approach, and extricating ourselves from what appeared to be interminable miles of sago and mangrove swamps, we ascended, towards evening, a ridge from which the whole of the south-east side of the island spread like a map at our feet. The fertile valleys between the spurs of Mount Rossel were still clothed with forest, and we saw little sign of cultivation to support the theory that the south-east side of an island is the most

quest, but the Indians had entirely a time of it. In the middle of the island was a swamp, on which was situated the only village of the tract. The nation had been punished two years previously for the massacre of two Englishmen and their crew, and had deserted almost. The few scattered inhabitants of this village had probably lately returned and had defended their dwellings by a row of spears set in the ground, and an ditch of 13, inches high, the top of any one man's head was

On the 20th we reached the unspeled island of At-Aiguan, of which the natives name is Atletua. This island is more than 100 square miles in area, being about 90 miles long, and varying in breadth from about eight to nine miles on the west end. The west end consists of a low, narrow isthmus named Atlatla, about 100 feet above the sea, some part of it being a delta. The eastern part of the island consists of very rugged hills, the work which the streams have cut very deep and narrow ravines. These are composed of coral upheaved by volcanic action, and are broken and more or less formed from channels and with broken layers of coral. At the head of the eastern coast there is a fringe of coral, upheaved by volcanic action to a height of more than 100 feet, through which the sea and you pass. There are three very high peaks on the island, the highest of which was seen from the north-west end of the island. At the apex which was the highest peak on the north-west

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outside the houses; the heads so displayed are those of enemies. They have no belief in a future state. They are head-hunters, but we could not ascertain that they are cannibals. Though there was no war while we were there, the different villages were independent, and apparently unfriendly. They are a healthy race, though they suffer much from the ringworm (*Tinea desquamans*). Leprosy does not apparently exist, and we saw no elephantiasis. It was found on comparing the vocabularies that the language of St. Aignan bears but little resemblance to those of the neighbouring islands. It is replete with words terminating in consonants, chiefly with *an* and *ak*. In counting they repeat the first five numerals, but have distinctive words for the decimal numbers. They have the same complicated declension of the pronouns which is common to the whole of Papua and Polynesia.

The prospecting miners found gold at three different places in the east end, but not in large quantities. During their search they came upon a curious cave, which we afterwards visited. We found that the limestone hills which compose the centre of the island were honey-combed with caves and densely timbered. We crossed the range and descended to a most romantic spot called by the natives Kaiaba. From one great wall of limestone sprang a stream which, after 200 yards of daylight, plunged into a great cave in the opposite cliff. The month was a perfect arch, 150 feet from floor to roof. At the far end the river thundered down into a black tunnel, through which it passed under the range, emerging into daylight after some three miles of darkness.

On October the 24th we reached East Island, a small inhabited island composed of altered coral situated in long. $152^{\circ} 5'$ and lat. $10^{\circ} 30'$. The few inhabitants of the only village appear to be a colony from some other island, and probably do not remain here all the year. They were extremely shy.

On the following afternoon we anchored on the north-east point of Normanby Island, the most easterly of the D'Entrecasteaux Group. Like St. Aignan, it has no protecting reef. The island is a narrow I-shaped mountain range, with deeply furrowed sides and wide valleys excavated by water-wear. It is probably nowhere of greater breadth than 10 or 12 miles, and the area about 350 square miles. The highest parts of the island are perhaps 3500 feet above the sea-level. The south-eastern portion is composed of schistose slate varying much in hardness, interlaid with veins of white crystalline quartz, which is free from any compound of iron or other metal. Traces of gold were found in the creeks. Toward the north end of the island the formation is igneous, consisting mainly of limestone, but in some of the river-beds are large beds of basalt and boulders of siliceous stone. The mountains of Dawson Straits, however, differ much in formation from the rest of the island. The rock appeared to be a sort of porphyry, and furnished

indications of tin. It should repay a more thorough examination. The north-east point of the island was very populous, and the extensive cultivation could be traced by fires far up the range on the edge of the forest, which showed that clearing was still in operation. We found the natives' anxiety to trade so keen as to threaten a disturbance when they were refused. They have strong Papuan characteristics. The men frizz out the hair into a great black mop, and both men and women paint the face, but do not tattoo. They wear the usual dress.

On the 26th the Administrator and I penetrated some miles inland, passing through no less than thirty-one villages, and seeing many others perched on every available spur or ridge, and surrounded by its plantations. These villages were remarkable for their cleanliness. The houses were built in an irregular circle surrounding an open space in which was often a grave bordered with amaranths, crotons, or hibiscus. The houses were of a type new to us, the roof saddle-shaped with high-peaked gable-ends, thatched with pandanus leaves, and standing on posts six feet high. The cultivation is most remarkable, and bears witness of their activity and industry. The ground they plant in is in some instances upwards of 60° from the horizontal: yet the soil is very rich, a deep dark-brown mould resting on a clay bottom, the surface of the schistose formation below. To prevent the soil being washed away, the trunks of trees are pegged down in long lines sometimes only a yard apart, and their boundaries are marked by saplings laid lengthwise up the hill. Some of the gardens are 20 or 30 acres in extent. I am sorry that the limits of this paper will not permit me to give a more detailed description of this interesting people.

Normanby Island is the eastern limit of the wallaby, of which we found two varieties. It is also the eastern limit of a bird peculiar to the D'Entrecasteaux Group—the largest of the five species of *Manucodia*, which are still classed with the Birds of Paradise. It is about the size of a crow, of a metallic blue-black plumage. The feathers of the whole body and tail are crimped, and the plumes beneath the wings rudimentary. It feeds on insects, and though the strait which divides Normanby from the mainland is only ten miles wide, this bird, which is the commonest of all large birds in the D'Entrecasteaux, has never crossed to New Guinea. But its great peculiarity, one which it shares with the other members of its class, is that the windpipe after leaving the neck travels down to the vent between the skin and the body, and then returns and enters the thorax. Its length when extended is 18 inches. It is loosely attached to the body, and among the forty specimens we skinned there was considerably variety, the windpipe in one or two specimens curving beside the tail on to the back before turning. In a similar variety of the *Manucodia* the windpipe is coiled neatly on the breast before entering the thorax. This extraordinary development which should, one would suppose, render the bird more

vulnerable, is probably the cause of its peculiar note, a low tremolo whistle, of so penetrating a *timbre* that it can be heard for more than a mile.

We anchored at three other places in Normanby, and explored inland at two of them. War and the difference of dialect have so completely isolated the various tribes as to make them different peoples as regards everything but their physical characteristics. At a spot not ten miles from a tribe that would barter all they possessed for tobacco and pipes, were people so ignorant of their use that they put the tobacco into a bottle we had given them, poured water upon it and drank off the compound. With these same people we narrowly escaped from a collision. They were evidently so excited and frightened at their first introduction to white men as to be ready for anything.

Before leaving Normanby we established the fact that the small island named Harris Island is in reality a low flat of the main island.

On October 31st we anchored at the east end of Ferguson Island, the largest of the D'Entrecasteaux, being 30 miles long by 17 broad, and containing probably more than 500 square miles. There are three great mountain masses on the island: Mount Kilkerran, on the north-east corner, 6000 feet high; the Maybole range, on the north-west, which is probably 5000 feet above level; and a lower range in the south-west corner, which is apparently unnamed, and which we were unable to examine. The formation of the Kilkerran and Maybole ranges is the same, consisting principally of micaceous schist with veins of white quartz intersecting it. In the beds of the rivers were boulders of quartz, and of a slaty rock very rich in silica, and there were boulders of what seemed to be a kind of porphyry. The prospecting miners found no trace of alluvial gold in the northern or western parts of the island, and, from its formation, it is improbable that this metal will be found there.

The south-eastern part of Ferguson and the small outlying islands, Goulvain and Welle Islands, are of igneous formation, and we noticed two extinct volcanoes and some hot springs. This part is densely populated, owing probably to the fertility of the extensive flats of volcanic deposit. The people showed intense eagerness to trade, and on our landing we were mobbed by an immense crowd of both sexes clamouring for tobacco, which they preferred to all other European articles. They were friendly, but far too familiar to make a long stay advisable. Their dress, appearance, houses, and style of living were similar to those of the people on Normanby Island, whom I have already described, and from the degree of civilisation they had attained, as compared with their near neighbours, it may be concluded that they are in constant communication through the trading canoes with the natives of other islands. I noticed here a harmless lunatic dressed in a woman's petticoat, evidently annoying the people near him, but he was pointed

out to us with an air of good-humoured contempt. In most parts of the Pacific he would not have been allowed to live.

The style of cultivation here deserves a few words. A large yam plantation on a volcanic flat several hundred acres in extent was divided into blocks by neatly kept paths. The reeds up which the yam vines were to run, instead of being merely stuck into the ground as elsewhere, were inclined upwards from each yam hill, so that four reeds met and were fastened to a stake planted accurately in the centre between the four hills. This was done over the whole plantation with an accuracy and regularity which would have shamed an English gardener.

At this spot we found one man who had learned a little English in Queensland, and from him I made up a vocabulary. He knows nothing of the natives to the westward except that they were cannibals and spoke a different language. The dialect of East Ferguson was found to have much in common with that of East Cape on the mainland.

On the 2nd November we anchored in a small bay on the north side of the island. On landing we were surrounded by an armed crowd of natives, who were evidently in a state of the wildest excitement. They knew nothing about tobacco, beads, or the ordinary articles of trade, nor did they seem to care for anything we could give them. As their shouting and gesticulations threatened to end in a disturbance, a decided impression was produced by the discharge of a rifle. From the effect produced it was evident they knew nothing of firearms.

They were evidently a bush tribe—Ishmaels, who have no communication with their neighbours, receive no visits except from enemies, and hold their rough wild country at the point of the spear. Proceeding along the beach we came to a dry branch stuck upright in the sand. This was evidently their boundary, for they tried to dissuade us from passing it, making signs that we should be speared if we did. We soon saw a large crowd of armed natives ahead watching us from the cover of the trees. They were extremely suspicious, and it was only by depositing beads on the ground and retiring from them that we could induce them to approach. We eventually accompanied these people in spite of their efforts to dissuade us, to their village, an ill-built collection of huts perched on the steep side of the mountain, and would have proceeded further, had we not seen that they were preparing to oppose us by force, having probably concluded that persuasion would be utterly lost on a people sacrilegious enough to infringe the numerous taboos that had been laid across our path. We suffered from the want of interpreters, for, had they understood that we were on a friendly visit with no ulterior motive to their detriment, they would no doubt have welcomed us. These people were true Papuans, and there were no straight-haired people among them. The division of a narrow bay, perhaps a couple of miles wide, between two hostile tribes, who even plant their food at the

point of the spear in face of each other, illustrates well the social condition of this large and populous island.

On the 3rd we anchored at the foot of Mount Kilkerran. A remarkable feature of this group of islands was well illustrated here. Though Hughes Bay consisted of many miles of flat land yet we noticed that the sides of the mountain, consisting of great precipices and steep inclines, were dotted with villages up to a height of 3000 feet, half concealed in clumps of coco-nut palms. Many of the lower slopes were in actual cultivation, but the upper part was clothed with forest. The flat land is full of salt lakes, and large clumps of sago. As we proceeded slowly westward on the following day, a large crowd of natives were seen following us along the shore. When we went ashore a few miles to the westward we found them awaiting us armed and in a state of great excitement. They had evidently penetrated into an enemy's country in their curiosity to see us, and several times while they were with us a false alarm was raised and a rush made for their arms. We had here to submit to a curious ceremony. When all were seated a scented bark resembling sassafras, to which they appear to attach much value, was handed to us, and an old man having chewed some of it, spat it first over some of our party, and then over some of his own people, mumbling some words while doing so. After which ceremony trading proceeded in a friendly way. They appeared to care nothing for beads, tobacco, nor knives, but they were pleased with small strips of Turkey red, and when this was exhausted we gave them in exchange for clubs, yams, and combs, small squares of newspaper which were received with some awe, and probably regarded as talismans of great virtue.

Not two miles distant we came upon a tribe who showed all the apathy and repose of manner of North American Indians, and the contrast was so great that it was difficult to believe that they were of the same race as their noisy and restless neighbours.

After searching in vain for the hot springs marked on the chart as existing at Cape Labillardière, we anchored at the foot of Mount Maybole in Moresby Strait. We were now on the west of Ferguson in the strait, three miles wide, which separated it from the unexplored island of Goodenough, whose twin peaks, more than 7000 feet above sea-level, now towered above us. The natives were at first very shy, but it was our object to get on terms with them, for at this spot we had heard of a very rare species of bird of paradise. On our showing them a skin of the *Paradisæa Raggiana* they at once pointed up to the forest on Mount Maybole, and on the 8th of November I went ashore with a party of four to spend the night at the top of the range. The natives being friendly we engaged carriers and ascended the mountain, and were fortunate enough to secure six specimens of this rare bird. The plumage is similar to that of the *Raggiana*, which is familiar to everybody, except that the plumes are of a deeper orange, and the shield on

the breast is grey instead of black. The birds of paradise used until recently to be classed with the crows. There are now thirty-seven known species. The males do not acquire their full plumage for four years, so that although so many are shot the young males and females will always be left untouched to perpetuate the species. Their habits have been too fully described by Wallace for me to touch upon them here, except to describe the method of shooting them. The birds begin to call at daylight and to collect upon the "dancing tree" until about 7-30 a.m. when they separate and they are not seen again until an hour before sunset, when they again begin to call. The call is unmistakable and can be heard for a great distance, *Kaük-kaük-kök-kök-kök-kök*. It is easy to imitate, and the bird will approach within shot, flying from tree to tree in response to the imitated call.

On the 10th we moved to Seymour Bay, a wide mangrove-fringed bay on the west side of Ferguson. There was here a large extent of flat land and sago swamp, in which we found some saline lakes, and some hills giving off sulphur fumes strong enough to discolour the white paint on the vessel which was lying nearly two miles distant. Some of the hills appeared to be composed of alum and sublimed sulphur. There were also springs of boiling water and boiling mud, and in one instance boiling mud was spouted up from a chimney-like cavity in the hill-side. This part of the country was uninhabited, but the sides of the Maybole range were thickly populated. These people opposed the progress of some of our party, but happily without any actual collision. They were probably taken by surprise. It is not impossible that this flat land is continued across the island to Hughes Bay, as we could see no dividing range of hills, and that the igneous formation extends some distance inland.

On the 8th and 9th a portion of the south-east coast of Goodenough Island was inspected. A great range of mountains running north and south, and culminating in two peaks not less than 7000 feet high, forms the centre of the island. On the east side is a plain some seven or eight miles wide, nearly clear of forest. The formation is slaty schist containing much mica and quartz. On the east side are projections of igneous formation, and on the point nearest to the sulphur springs in Seymour Bay is a small crater, probably not very long extinct. On the north-east side we passed through several inland villages, one of which had no less than 109 houses. The people resembled the Ferguson Islanders in appearance, but their quiet and friendly demeanour created a most favourable impression after our experience of the noisy and excitable natives of Ferguson Island.

Their houses differed from anything we had hitherto seen. They are built on raised platforms with a curved roof, but they are very long and taper away from the end nearest the village square. The narrow end is closed in with wooden planks so as to form a sort of bedroom.

They are very long in proportion to their width and height, and have an appearance that is quite peculiar.

The villages in this part of the island appear to be on friendly terms with each other, but to preserve each its own independence. The people have no sea-going canoes, and are practically an inland or "bush" tribe. They seemed free from the common diseases of Melanesia—leprosy, elephantiasis, itch, and ophthalmia, but suffered much from ringworm.

"Colours" of gold were found in one of the creeks, but it is improbable that this metal will be found in payable quantity.

With Goodenough, the most westerly of the D'Entrecasteaux group, our expedition came to an end. We had with a small party examined a number of islands whose inhabitants, if they had ever seen Europeans before, had good reason for feeling hostility towards them, but the whole expedition had been accomplished without any collision with the natives. They are undoubtedly treacherous and untrustworthy, especially when their cupidity is excited, but, provided that travellers will observe ordinary caution and vigilance, respect native customs, and pay for everything they receive, or are obliged to take, I believe that very small parties can traverse the country with safety.

The practical miners who were with us established the belief that this part of the British possessions will never form a large gold-field, although the patches of alluvial gold in Sudest and St. Aignan can be profitably worked for a short time. We could not ascertain the actual spot whence the "greenstone," from which the stone adzes are made, is brought, but as the natives of Goodenough pointed westward, it is perhaps to be found in Huon Gulf. In New Zealand the greenstone is generally found associated with gold.

The following discussion ensued on the reading of the above paper:—

Captain W. J. L. WHARTON (Hydrographer to the Admiralty) expressed the pleasure he had felt in listening to a paper which gave so interesting an account of two groups of islands of which so little was previously known. The three larger islands, Normanby, Ferguson, and Goodenough, he believed had never before been visited, and absolutely nothing was known about them.

Captain FIELD, R.N., said he had just relinquished the command of the *Dart*, which had for the last two years been employed in the waters to the south of the Louisiade Archipelago. He was sorry that the Hydrographic Survey did not permit of much information being obtained with respect to the customs and manners of the natives, while the collections were necessarily limited to geological specimens. During the last year the *Dart* had five natives on board. They were very intelligent, and of the greatest assistance to him. They spoke very little English at first, but it was astonishing how quickly they picked up the language. Traders did not seem to have penetrated further than Coral Haven. In one part of the island the natives talked a little English, while in another they did not. He took the five natives on board at Brierley Island, and they were with him five months. They were great favourites with the crew. The effect of a man-of-war being in those waters was very good. The year before a murder had been committed in Jeannet Island, and

when the *Dart* first arrived it was extremely difficult to get into communication with the natives, and no interpreters could be obtained, but the second year there was no trouble at all in getting them; in fact, half the islanders might have been employed. The natives seem to be decreasing very considerably in numbers, judging from the description given by Captain Owen Stanley, who made a running survey about forty years ago, and who spoke of large villages thickly populated. Those populations had disappeared. The whole of the Calvados chain was very sparsely inhabited. He had no difficulty with the natives, and used to employ them in carrying the survey instruments to the tops of hills, and clearing the tops. As they were always paid well and punctually they could be relied upon. There were no cases of treachery, though they had one or two chances. One night he had to go with five men some miles inland, and though there were about 200 natives around them no trouble was experienced. In the group there were apparently no chiefs. Each village had an old man who had a certain amount of influence, but it was merely personal. There were two types of houses, the saddle-shaped and the turtle-backed. The latter extended from Rossel a long way to the north and west, but in China Strait the houses were all of the saddle-backed shape. The Calvados chain was of a slaty formation, with veins of quartz thrown up, and the traders imagined some gold was to be found there, probably in the larger of the islands. It was very likely that Panawina Island would have traces of gold. On some of the smaller islands there was a good deal of grass land, and sheep did remarkably well there. He took twenty sheep with him each year, and landed them, and at the end of four or five months they were extremely good eating. The chief article of barter was tobacco, which was specially made for the island trade. The natives were also fond of beads. One of them particularly commissioned one of the crew, when the vessel was going to Queensland, to bring back a particular colour of beads, and they showed that they had taste. The climate was very good from July to December. At the end of October the trade-wind slackened off, and it began to get rather hot. In July, August, and September it blew very hard, and the sea was very unpleasant for boats. Still, that made the climate healthy, and directly the wind slackened it became rather unpleasantly warm. During two seasons amongst these islands there was only one mild case of fever on board the ship. The anchorages were very bad. The water was very deep, from 30 to 40 fathoms in the passages, and the tides ran about four knots an hour through them. In China Strait they ran six knots. On one reef there was an island four or five miles long and very narrow, of limestone formation, having a number of caves in it. It had probably been upheaved. It appeared to him that there were corals in it. Panmit Island had distinctly been raised. The lagoon was about 20 fathoms deep, gradually shallowing to one or two fathoms. The island rose to a sharp peak of 400 or 500 feet. It rested on a coral platform 60 feet high, which had evidently been upraised, and the cliffs were very steep. At the east end of St. Aignan there was a coral spit with two low islands at the end of it, but that was the only coral round the island. The hills there rose to 4000 or 5000 feet, the highest part being in the centre. The eastern part was much lower. The natives of these islands were generally at enmity with one another. When he wanted to land his interpreters at one spot, thinking they would be able to find their way to their own island, they said if he did so they would be certain to be eaten.

In answer to questions,

Mr. THOMSON said that Professor Flower had told him that the peculiar formation of the windpipe of the birds of paradise had already been described in scientific publications. No doubt the fact that in some parts the natives could only count to five was associated with the five digits of the hand, but when one of them counted

his fingers he turned them down. It did not seem to occur to the majority of them to use both hands.

The PRESIDENT thought they had all listened with very great interest to the excellent paper which Mr. Thomson had read. The region described was very unlike that which, at the previous meeting of the Society, Dr. Nansen had pictured to them. They smiled at the account which Mr. Thomson gave of his estimable friend who was very kind to Europeans but devoured Chinese; they heard with interest of the sombre woods of Rossel, redeemed to a certain extent by the orchids; they were pleased with the account of the successful and most careful agriculture of the islands of Normanby and Ferguson, and listened with curiosity to the account of the extraordinary political *morcellement* of the latter island, which was the antithesis of the tendency which had been going on during the last generation in Europe—a tendency to aggregation which led to the union of Germany and the union of Italy. Mr. Thomson was impartially interested in philology, ornithology, entomology, and geology—in fact in all the “ologies” except tautology. He was sure they would give their most thorough approval when he thanked Mr. Thomson for the excellent spirit in which his paper had been written, for all the valuable information he had given them, and for the wise remarks he had made about avoiding collision with the natives.

Mr. THOMSON thanked the meeting for the kind attention that had been given to his paper.

Expedition to the Cockscomb Mountains, British Honduras.

By J. BELLAMY.

HAVING been selected by Governor Goldsworthy of British Honduras to accompany his exploring party to the Cockscomb Mountains to survey and report on the geological and botanical features of that hitherto unexplored district, I left Mullins river on April 3rd, 1888, in my sailing boat, and joining Dr. Gabb at North Stann Creek, we proceeded together down the coast for the mouth of the South Stann Creek which we reached about 8 p.m., guided by camp fires of the Carib porters who had preceded us with baggage and provisions. We anchored outside the surf and paid out all our cable as it was blowing hard from the north-east, and found the landing both difficult and dangerous.

The camp at night presented an animated scene with the firelight playing on the groups of half-naked muscular Caribs in their graceful attitudes, and at 7.20 a.m. on the 4th of April we started on the journey up the South Stann Creek (or river), with Dr. Gabb and fifteen Caribs in five dorays, i. e. dug-out canoes. We found the river for some distance very narrow and tortuous, this being the case with many of the rivers on this coast, which, when they leave the bed-rock, seem to lose themselves in the sand, and at their mouths are distributed over a large delta of mangrove swamp.

The banks are formed by a deep alluvial deposit with a large amount of ferruginous clay, and are covered with a luxuriant growth of palm-trees and wild cane. The bed of the stream is of quartz and granitic sand with a quantity of mica. The bends of the river were very much blocked with flood timber and logs, and it required considerable exertion and a frequent use of the axe to get through. Our course was a little south of west, about two miles per hour. The undergrowth along the river banks is comparatively light and there is not much big timber, with the exception of a few cottonwood trees (*Ceiba*).

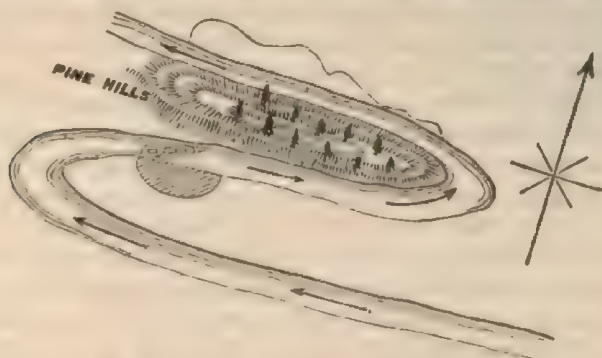
At 8.50, steering south, we passed a branch running east called White Creek, which empties itself into the sea at Jonathan Point. For the first hour the river was very narrow, but after that it opened out into long and wide reaches with more water. After 10.30, we steered south-west; at 12.30, west, by long shallow reaches without any obstructions, between high banks of ferruginous clayey soil covered with big timber trees, such as the Ymeri, the Sta. Maria fig, and some rubber trees (*Castilloa elastica*), we camped on a sandbank at 4 p.m., and found that we had got behind the coast range of hills; the barometer showed an elevation of 100 feet.

April 5th.—We broke camp and started at 6.15 a.m.; a cloudy morning with showers; course south-west, then due west, and by a long straight reach to the north-west; at 7.30 sighted high hills covered with pine trees (*Pinus cubensis*) bearing north-west; and at 8 reached the first falls, which we found very dry and difficult to pass. Above the falls the river runs for a considerable distance through deep gorges between slopes about 1000 feet high, covered with small pine trees and an undergrowth of wild cane and fern; the bed-rock is an indurated shale with the strata almost vertical and with small veins of quartz trending in a south-easterly direction. The bed of the river is quartz sand and gravel with a large quantity of mica, and there are some granite boulders.

At 10.30 we reached the big falls, where we were obliged to make a portage, hauling the dorays over with ropes, and carrying baggage and provisions by land. The scene was a most exciting one, the mighty din of the torrent rushing between its narrow walls, the Caribs, some standing up to their armpits in the water above the falls, hauling on the ropes, others at the foot apparently regardless of the rush of water, tilting the canoes until they almost stood on end, others perched on the rocks and boulders at various points to fend off as the dorays were hauled past them.

After the hard work of getting over the falls we gave the men a rest and started again at 11 heading north-west, and from that to west and west by north, and arrived at Three Sisters Bank at 12.30 p.m., where we found some old huts and made camp for the night; the barometer showed 250 feet elevation. Three Sisters Bank is an old

mahogany station, and is so named from three large granite boulders lying in the stream. We noticed that at this point the river takes a very abrupt bend, getting behind a second and higher range of hills.



6th.—Remained in camp at 'Three Sisters' Bank awaiting the arrival of the Governor and party, and occupied ourselves preparing the camp for his reception.

7th.—At 6.15 a.m. the Governor and Mr. Blockley arrived, having been benighted on their way from Sittee and obliged to sleep in the bush on a very wet night. At 12.30 a messenger arrived from Lopez Bank with the information that Mr. Jerningham and Mr. Allen had arrived there with the rest of the party. We at once proceeded to join them, when we found that Mr. Reginald Ross had accompanied them, kindly providing them with horses and mules for transport, &c. From first to last the expedition received great attention and assistance from this gentleman, who entered into the spirit of the exploration with the greatest interest and enthusiasm. The river here runs due east for about two miles. Thermometer, 76° Fahr. The next day, April 8th, at 6 a.m., the thermometer registered 59° only.

The land on the old mahogany banks is of excellent quality, growing very fine timber, including various valuable hard woods, besides mahogany, particularly Sta. Maria (*Calophyllum calaba*) yameri, figs, and many other trees rich in gums and balsams. Up to this point the rubber (*Castilleja elastica*) was plentiful on both banks of the river. These banks would be excellent sites for cacao and coffee plantations, the fine truck paths opening up the land for some distance back from the river, and there being very little undergrowth to clear, whilst the soil is composed of the rich vegetable deposit of ages.

We started again on our journey up the river, steering from west to W.N.W., with many rapids and falls difficult of passage in the dry season. This portion of the stream is very much blocked with granite boulders. Arrived at Scorpion Bank and camped for the night.

The river at this point divides, one branch, the Cockscorn, coming

from the north, the other from the east and south and south-west. I left Scorpion Bank with Mr. Jerningham at 3.10 p.m., going S. 30° W. to S. 45° W. parallel to the river, then due south, with a steep hill (Observation Hill) on the east; we ascended the hill to the height of 520 feet, then climbed a tree about 50 feet, and saw the Cockscomb range extending over an arc from south-west to north-west apparently about 15 miles in a direct line. We came down the hill again at 4.30 and walked up the course of the river, trending from south-west to south, and then a sharp turn to the east; the stream is not deep enough for dorays. Walked down the bed of the river, passing a branch bearing W. 30° N. At 7h. 52m. 30s. I observed altitude of Pole star, $33^{\circ} 16'$.

9th.—In the early morning we climbed the hill east of Scorpion Bank, had some trees felled, and took magnetic bearings of the principal peaks. Left Scorpion Bank at 11.15 a.m., S. 80° W. to due south and S. 30° W., with steep hills on the east. The angle of slope of the hill



Outline of Cockscomb Peaks bearing S. 72° W. as seen from a hill 620 feet high, 3 hours N. 40° W. of Scorpion Bank.

is 33° , it is from 500 to 600 feet high, of granite formation, intersected by deep gullies. We walked due south till 11.30, then to S. 30° W., meeting with small falls and granite boulders, S. 75° W.; and at 11.45 turned into a branch N. 50° W. to N. 70° W. and N. 20° W. Then a sharp bend to S. 50° W.; at noon N. 60° W. to due west up to 12.15, when we found the water too shallow, so turned back. In the afternoon we explored the north-west branch known as the Cockscomb Creek and found an old path running our course for about three miles; we made a cut through the bush for about another mile and a half, and then returned to Scorpion Bank to report.

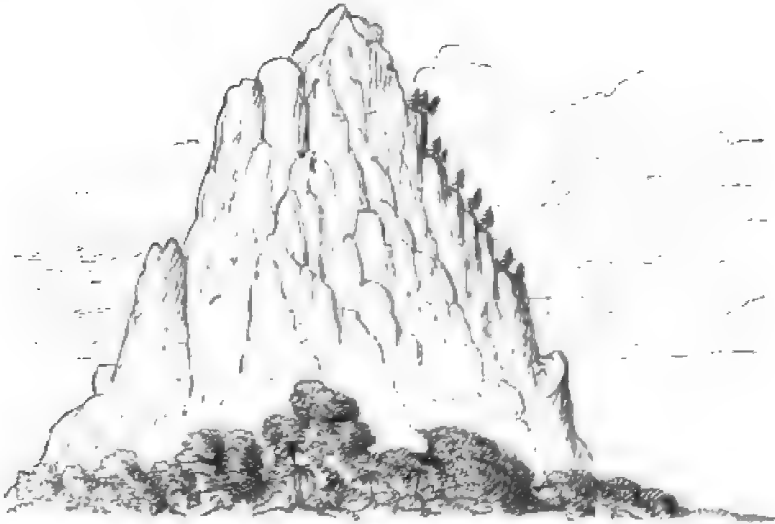
Tuesday, 10th.—I left Scorpion Bank with Mr. Allen at 7.30 a.m.

we travelled by the above-mentioned path at the side of the Cockscomb branch, and cut through the bush until 11.0; then climbed a hill to our north to a height of 620 feet (granite), and had a fine view of the peaks bearing S. 72° W.

We came down, and crossing the river, proceeded up the south bank until we struck the main spur of the south-east peak, named Goldsworthy Peak, which we ascended to a height of 1240 feet; came down again and camped on the river bank, where we were joined by the Governor and Mr. Wickham, who had followed our track.

The country passed through after leaving Scorpion Bank was a series of steep narrow spurs, with deep gullies between them, scantily clothed with undergrowth and timber trees of no great size. The water vine abounded, so that we were able to quench our thirst at any elevation; a piece about 3 feet long and 12 to 15 inches circumference often affording nearly a pint of clear cool water. The bed of the river here is a hard shale, almost vertical, and with granite boulders and some quartz.

Wednesday, 11th.—Started at 7.15, going N. and N 45° W. to W., along the scarp of a deep ravine to the north till 7.45. Here I think a branch joins in from the north, as I heard falls in that direction. Followed up the main stream W. 25° S., climbed the scarp, and struck



View of the peak at 10 a.m. bearing W. 26° S.

the trail to the 1240 feet station of the previous day at an elevation of 720 feet. Reached a tree marked 900 at 8.40, and at 9.35 reached the 1240 feet station. Went on for another fifteen minutes. Cut down some trees, and saw the mountains to the north-west, and found ourselves close under a peak bearing W. 35° S.

At 10.15, in company with the Governor, crossed a ravine with a good stream of water running N. 15° W., elevation 1070 feet; we had thence a steep climb up Goldsworthy Peak to an elevation of 1790 feet, and at 1800 feet took magnetic bearings of the other peaks. I collected specimens of the rock, a hard limestone with crystalline quartz running through it from north-west to south-east. We noticed good sized cacao trees growing at 1700 feet.

The large Cohun palms were not seen after passing an elevation of 600 feet, and very little mahogany, though plenty of Sta. Maria, ironwood, and the mountain cabbage-palm (*Oreodoxa oleracea*). I occasionally noticed sarsaparilla of two varieties. I think that the alteration in the character of the vegetation in this latitude is due not so much to the elevation as to difference of soil, as I noticed that it changed directly we left the granite.

Thursday, 12th.—Left our camp in the ravine with Mr. Allen at 7 a.m. and skirted the eastern slope, going north for a short distance, then down a steep hill till we struck the river in the main valley at 8.16. We saw no cohun palms and no rubber, but plenty of cacao and sarsaparilla. The river running from west to east between hills of from 33° to 35° slope.

At the crossing of the river I found indication of gold in the washing of sand and clay; I picked up some good specimens of quartz, found evidence of lead and silver, and picked up some specimens of graphite; iron abounds.

We left the river and followed the scarp till we reached an elevation of 890 feet, we then decided to make south for the main ridge of the mountains, of which we had previously obtained bearings. Saw plenty of Sta. Maria, ironwood, cabbage-palm, but no mahogany or yemerí.

At 10.55 we struck the ridge at an elevation of 990 feet; reached the top of the ridge, 1250 feet, at 11.14, and found ourselves close under a peak bearing due south, with a few pine-trees growing on the top. This was named Bellamy Peak. We climbed it to a height of 1800 feet, finding it very precipitous. We saw Victoria Peak, the highest of the range, bearing west by south, and noticed that the horizontal line cut it at something less than half its height. Veins of quartz were exposed vertically in the hill-side; they must be easy to quarry; we brought away specimens. The mountain cabbage-palm was seen growing at 1800 feet. Coming down from the peak to 1250 feet, we turned north-west down a ravine, arriving under the main peak at 3 o'clock at 1000 feet, where we pitched camp.

From our camp in the ravine under the main peak of the Cockscombs we sent a messenger back to the Governor to tell him of our situation, and to inform him that the peak was accessible with one day's walking. Barometer 29.38; thermometer 72° .

Friday, 13th.—Prospected along the bed of the stream in the ravine,

and found good specimens of quartz, and where there was clay enough to retain it, gold colour and manganese.

At 11.45 the Governor and Mr. Jerningham, with the rest of the party, joined us. In the afternoon, in company with the Governor, we



Victoria peak, bearing W. by S., the spurs trending in N.E. direction.

prospected in a northerly direction to the main river, where we found good indications of minerals, particularly lead and silver. The bed of the river was full of large quartz boulders, and iron and pyrites were abundant.

Sunday, 15th.—Mr. Wickham and Mr. Blockley were sent out to try for an easy route by which to ascend the peak. Mr. Blockley remained on the saddle east of the peak at an elevation of 1800 feet to prepare a camp, whilst Mr. Wickham continued the ascent, which he managed by climbing round the heads of the spurs, over many difficult and dangerous places, and finally, after a precipitous and arduous climb, especially up the last 500 feet, he succeeded in reaching within a short distance of the summit.

On the same day the Governor, with Dr. Gabb and myself, broke camp and started for the saddle, where we arrived at 11.10 a.m., and found Mr. Blockley awaiting us. We had the trees cleared on both sides, so that we had a view north and south, the ridge or saddle at this point being only about 30 feet wide, and with very steep slopes.

In the afternoon I walked for some distance along the saddle with the Governor, and met Mr. Wickham returning with the good news of his success in finding the peak accessible, but he was terribly exhausted with his exertions and want of food and water. Ascending the hill from the camp in ravine, I noticed extensive quartz-reefs, almost vertical, and trending from north-east to south-west. From 1600 feet upwards there is very little undergrowth, and the timber is small.

There were a few small mahogany-trees at 1800 feet, but I did not see any rubber-trees after leaving the valleys.

In the afternoon we continued the route along the saddle, and ascended a peak 2000 feet, named Jerningham Peak, easy of access. The top was covered with dwarf fig-trees, and many and various orchids, specimens of which were gathered and preserved for identification.

16th.—The Governor, with the whole party, started to ascend the peak by the route previously found by Mr. Wickham, which is one suited only for a skilful and experienced mountaineer. With great difficulty we succeeded in reaching a shoulder some 600 or 700 feet from the summit, but at this point further progress was found impossible for some of the party. Having a good rope with me, I decided to go on, and managed to scale the precipice, and having reached a projecting point of rock, made fast my rope and assisted Mr. Allen and three Caribs to get up. Then by the aid of gnarled and stunted fig-trees, and occasionally by the rope, we succeeded in reaching the summit, and having recovered sufficient breath, celebrated the event by giving three cheers for the Queen and the Governor.

The top of Mount Victoria is a thorough peak, with but little room for moving about, and an extensive view is obtained on all sides. For some distance the prospect is nothing but alternate ridge and valley, densely wooded. There were no higher points north of us, but to the south Montagua and Omoa, in Spanish Honduras, were seen towering above the rest. No open country was seen, nor any of the traditional lakes. I took observations for altitude, and cross-bearings to localise all the principal points. The barometer read a little under 4000 feet.

The descent from the peak was even more difficult and dangerous than the ascent, and we could never have managed it but for the rope, so it was late ere we reached the shoulder of rock where we had left the rest of the party. They had already started for camp, so as to pass all the difficulties before darkness overtook them. So we hastened on, and reached the camp on the saddle at 8 p.m.

During the night one of the Carib porters shrieked in his sleep, and this so alarmed his companions, already excited by their traditions and superstitions of the place, that they rushed through our camp, upsetting mosquito-nets, tents, themselves, and everything else in the darkness, imagining that Tapir Peccary or some of the evil genii of the place were among them, and it was some time before they could be reassured.

17th.—The thermometer on the saddle marked 69°; I took views of the main peak and of camp. We left the camp at 7.45 and arrived at the ravine at 9.30 a.m.; had breakfast, and continued the return journey over an old trail, reaching Scorpion Bank shortly after sundown—a long and trying march during which the Carib porters behaved admirably, carrying the heavy loads up and down the steep hills with the greatest good nature.

18th.—Left Scorpion Bank at 7.20 and walked down the river bank to Lopez Bank, where we found horses and mules kindly sent on to meet us by Mr. Ross; Dr. Gabb, Mr. Allen, and Mr. Blockley going on with the Caribs and dorays to the mouth of the river with the baggage. The Governor, Mr. Jerningham, Mr. Wickham, and myself pushed on through the forest on horseback and arrived at Mr. Ross's house at 5 p.m., where we received a hearty and hospitable reception. At midnight we embarked on board a fast sailing schooner which was in waiting for us, and at 6 a.m. the following day we landed in Belize.

This mountain or hill district we had explored, although so near the coast, had never been visited, and had always been enveloped in a cloud of mystery. The native imagination and superstition had peopled it with evil genii and all kinds of mysterious creatures, and the main peak was said to be surrounded by a lake and unapproachable by man. It is at least something to have broken down these absurd traditions and fears, and to have shown that there is a highland district within three days' journey of Belize which might be made available as a sanatorium.

The one thing wanting is a good road, and if that were made I feel sure that much of the land in its vicinity would be taken up for cacao and coffee plantations, for which it is particularly adapted, but up till now the Government seems to have done nothing to encourage immigration, but rather the contrary; as it is they charge too much for the land, viz. \$2 per acre. At present, only a small portion of the littoral is inhabited, and the best lands are in the hands of the idle native creoles, refugees from the neighbouring Spanish republics, and the so-called Caribs, a people of little use to themselves or anyone else, and contributing little or nothing to the commonwealth.

Our march was so rapid that I had but little time to devote to systematic prospecting, being principally occupied in navigating and guiding, but I saw enough to convince me that there is considerable mineral wealth, and I believe it would pay to have it thoroughly prospected. The probability is that gold will be found on the southern slopes of the mountains and in the streams having their sources on that side; in fact there is evidence that some of the Spanish squatters have been taking gold from Monkey river and the adjoining streams for some years. This is the more probable as I noticed on a voyage down the coast that as we went southwards we sank our low flat coast-line with its curious upheavals of conical limestone hills as seen at Manatee and Seven Hills, and that after passing Punta Gorda, that which is in British Honduras the middle mountain range, in Guatemala and Spanish Honduras extends to the coast, culminating in peaks of considerable height, such as Montagua and Omoa, about 7000 feet, on which both gold and silver are found in paying quantities. In Spanish Honduras the slate is a gold-bearing stratum.

Strange as it may seem in a colony so old, and only eighteen days from England, the interior is less known than Central Africa. One thing is certain, that it is a country capable of supporting a large population, and in the congested state of the mother country an effort should be made to people it with a useful community.

One of the most remarkable peculiarities of the climate and soil is that almost all the tropical products of commercial value may be grown on the same zone. I have frequently seen maize, rice, bananas, pine-apples, oranges, coffee, cacao, cotton, cassava, rubber, and coco-nuts, all flourishing on the same piece of land, and at an elevation little above sea-level. Cacao of good quality is found growing wild in the forest; there is also an abundance of fibre-producing plants, particularly hen-nequin and silk grass, varieties of the aloe, and there is a large extent of land suitable for cattle and mule breeding. Much of the comparatively poor land is fit for orange-growing—a fruit which, though common enough here, is not cultivated; and as in this climate it would be ready for the northern markets early in the autumn, it would supply the demand before Florida and Louisiana fruit were ready.

At present the country is utterly wanting in all the accessories of civilization, such as one naturally expects to find in a British colony. What it wants is population, and with that the rest would soon be accomplished, such as roads, railway, telegraph, agricultural implements and machinery, and with that I feel sure there is a prosperous future for British Honduras.

MULLINS RIVER, BRITISH HONDURAS,
Oct. 6th, 1888.

The Geographical Congress in Paris.

By E. DELMAR MORGAN.

THE fourth International Congress, intended to have been held in Italy, assembled this year in Paris, contributing its quota to the many scientific gatherings of all nationalities that have taken place within the past few weeks in the capital of fair France, and throwing additional lustre on her great Exhibition of 1889.

Everything that care and forethought could dictate combined to make this Congress a success. An organising committee composed of the most active members of the Geographical Society, efficiently aided by a staff of secretaries, elaborated a programme of scientific questions to serve as subjects of discussion, and reports and communications were invited on these. On the other hand, no pains were spared to provide social entertainment for those who might be present, while the Exhibition served as an unfailing source of amusement and recreation.

In pursuance of the programme, the Congress was divided into seven groups, viz.:—

I. Mathematics—including Geodesy, Hydrography, Topography, and Cartography.

II. Physics—Meteorology and Climatology, Geology, Botanical and Zoological Geography, and Medical Geography.

III. Economics—Commercial and Statistical Geography.

IV. History of Geography and Cartography.

V. Didactic—Teaching and Diffusion of Geography.

VI. Voyages and Explorations.

VII. Ethnography and Anthropology.

Members were divided into two classes, *Membres Donateurs* and *Membres Adhérents*, the former paying forty francs, the latter twenty francs, no other distinction being drawn between these except that the *Membres Donateurs* received a larger medal, and were enrolled on a separate list. Nearly every country was represented except Germany, whose absence was explained by the anti-German demonstrations reported to have taken place at the Exhibition. Among foreign delegates present were—for Belgium, M. Jules Leclercq, President of the Royal Geographical Society of Brussels; for Brazil, the Vicomte de Cavalcanti; for Egypt Abbate Pasha, Vice-President of the Khedivial Geographical Society, and his colleague, Bonola Bey; for Spain, Colonel Francisco Coello, President of the Geographical Society of Madrid, and M. Torres Campos, its Secretary; for Holland and the Dutch Colonies, Dr. Kan, Professor of Geography at the University of Amsterdam, Dr. L. Wynmalen and Prince Roland Bonaparte representing the Royal Institute of Philology, Geography, and Ethnography of the Dutch East Indies; for Hungary, M. Déchy; for the Royal Academy of Science of Bologna, Father Tondini de Quarenghi; for Mexico, Don Joaquim de Mendizabel Tamborrel, Professor of Astronomy and Geodesy at the Military College of Mexico; for the Principality of Monaco, its Prince; for Norway, Carl Lumholz, who has travelled four years in Queensland; for Portugal, M. Mendez Guerreiro, Vice-President of the Geographical Society of Lisbon, Senhor Luciano Cordeiro, its Secretary, Ferreira d'Almeida, of the Portuguese Navy, and M. da Silva Amado; for the Argentine Republic, Alexis Peyret, of the Argentine Geographical Society, and François Latina, of its Geographical Institute. Rumania sent representatives. Russia's delegates were Baron Nicholas Kaulbars, of the Imperial Geographical Society; Alexander Grigorief, Secretary of that Society; and Nicholas de Gondatti, of the Moscow Society of Naturalists. England was represented by Mr. Francis Galton, Vice-President of the Royal Geographical Society, and Mr. E. Delmar Morgan. Sweden sent Dr. Retzius and Baron H. von Schwerin. Switzerland was represented by M. Elie de Beaumont, Hon. President of the Geneva Geographical Society, M. Charles Faure, M. Henri de Saussure, grandson of the celebrated scientist, and Professor Amrein, Delegate of the Commercial Geographical Society of East Switzerland. The minor states of South America, Bolivia, Nicaragua, Paraguay, and Venezuela were also represented.

There were between 400 and 500 subscribers to the Congress. Among French geographers who took part in the proceedings were M. d'Abbadie, the Nestor of explorers and men of science, M. Barbié du Bocage, a grandson of one of the founders of the Paris Geographical Society, M. Alfred Grandidier, so well known for his splendid work on Madagascar, M. Milne-Edwards, M. de Quatrefages, M. Daubrée, and many others; while among explorers there were M. Caron, lately returned from Timbuktú and the Niger, M. Capus, the companion of Bonvalot in their remarkable journey over the Pamir to British India, M. Borelli recently returned from the Gallas country, M. Crampel from the Upper Ogówé, Captain Decazes from the Congo and Niger, M. Labonne, whose travels in Iceland and the Faeroe Islands have been published in the *Tour du Monde*, and M. Cottean, who crossed the whole breadth of Siberia and visited China and India. Last but not least among geographical stars of the first magnitude were M. Savorgnan de Brazza,

the explorer of the Ogowé and tributaries of the Congo, and M. Lessar, so well known for his trans-Caspian surveys.

Monday, the 5th August, was the inaugural day. At 9 a.m. that morning a good many were assembled at the Geographical Society's house, 184, Boulevard St. Germain, to hear an opening address from the veteran President, M. Ferdinand de Lesseps, who spoke as follows:—

"Ladies and Gentlemen—In opening this International Congress of Geographical Sciences I must first thank you for the *empressement* with which you have responded to our call, we thank also the sovereigns and princes, friends of geography, as well as the eminent *savants* who have consented to join our committee, and the ministers who have wished to be represented at our opening meeting.

"The Geographical Society of Paris, we are proud to recall it, is the oldest of all, and has always set the example of brotherhood in science; readily forgetting the distances that the progress of human industry causes daily to diminish, she extends the hand of friendship to all people beyond the ever changing frontiers, opening her doors only to scientific discussions which may inspire but not divide.

"From all countries of the world you have come with a double object: to take part in the labours of the Congress and to visit the International Exhibition.

"In the various groups to which your chosen studies call you, questions of great general interest will be submitted to you; in discussing them you will have solely in view the progress of science and the welfare of mankind.

"Geography, as we understand it at the present day, is not only the abstract knowledge of our globe, it comprehends also the complete relations of the earth and man, relations which we endeavour to ameliorate. This is the scope of geography, and we say with pride there is none grander.

"In Group I. you will be occupied with all that relates to the measurement of the earth, distances and levellings; this is the basis and, in a way, the rough outline of geographical studies. You will add to these, moreover, the general movements of the land and the currents of the sea—specially interesting to hydrographers and navigators.

"Group II. embraces the composition of the earth, the modifications of its surface, atmospheric influences on the human constitution, the distribution of animals and vegetables on the surface of the land and in the depths of the sea.

"With Group III. we shall inquire into the geographical causes of human groupings, the means of peopling and colonising countries still desert or closed to civilisation, and the development of great lines of communication with the view of stimulating commercial intercourse over the whole world.

"Group IV. will study interesting questions in historical geography and the history of cartography. To what extent ancient civilisation penetrated. What laws presided over those great migrations of people whom ill-defined interests swept to considerable distances. Members of this group will also endeavour to catalogue ancient cartographical documents, and encourage in every country the formation of archives for registering those travels and works which have advanced geographical science. These are precious titles to nobility which all nations should collect and preserve with jealous care.

"The labours of Group V. will have for their object the perfecting in every way the teaching of geography, the importance of which, indeed, needs no further demonstration; but the training of teachers, the choice of materials and methods, the foundation of special establishments, give place for interesting discussions, the diffusion of which must largely benefit geographical science.

"Group VI. is reserved for explorers. They will bring hither the fruits of an experience acquired at the cost of fatigues patiently endured and perils courageously

met. They will make known for the great benefit of their successors the means to be employed in order to penetrate into certain unknown or inhospitable regions, the most practical methods of observation on a journey, and hygienic precautions to be adopted in order to resist the influences of deadly climates. They will also determine what rules should be followed for the naming of places discovered by travellers, and put an end to the confusion often cruelly perplexing to cartographers.

"Finally, Group VII. will be occupied with the geographical distribution of the different races of mankind, languages in course of formation or newly discovered, and the written characters of people in a lower stage of civilisation.

"You see, gentlemen, from this summary of our programme that there will be no want of subjects of study. You will easily fill the two hours and a half which you will give each morning. If they should not suffice, we willingly place our halls at your disposal for supplementary meetings in the afternoon.

"To rest from your labours you will visit the Exhibition, and you will find there pleasure and profit. You will carry away with you, I am sure, deep admiration for this manifestation of human genius, and also the cheering impression that the best use of our physical and moral energy lies in cultivating to the best of our powers the arts of peace.

"I cannot conclude this address without bringing to your notice the Honorary Secretary-General of the Geographical Society of Paris, M. Maunoir, and two of his most zealous colleagues, M. le Comte de Bizemont and M. Charles Gauthiot, who were the chief organisers of our Congress."

Count Bizemont then in a few words explained where the several sections would meet, and the assembly broke up to join the various groups according to the inclinations or special studies of each individual.

It was evident that Group I. (Mathematics) would be among the most interesting, both from the fact that geography largely depends upon mathematics, as well as because this group, in the absence of M. de la Gyré, was presided over by the popular and courteous Prince of Monaco, whose deep-sea soundings and dredgings in his yacht the *Hirondelle* have contributed rich materials towards our knowledge of hydrography and marine zoology. Of the proceedings of this Group I. accordingly I shall speak more in detail while touching lightly on the rest.

Questions 1 and 2 were the first discussed. They were as follows:—Question 1. On the necessity of a unique catalogue of principal stars for determinations of latitude, and on the advantages presented by observations on differences of latitude for geodetic operations. Conjointly with this question was another set by Captain Colette—On an international map which should give with precision the elements (longitude, latitude, or co-latitude and altitude) of every summit of the geodetic triangles of the first, second, and third orders. Question 2. On the measurement of arcs of meridians or parallels in the southern hemisphere.*

In Group II. (Physics) M. Guerreiro, of the Lisbon Geographical Society, presided, M. de Saussure being on the bureau. A paper was read by M. de Mahé, sanitary doctor at Constantinople, on epidemics, with special reference to those from 1840 to the present time. Dr. Bleicher, professor in the faculty of medicine at Nancy, gave a summary of his important work on the Vosges, and this led to a discussion on the comparative geology of the Vosges and the Alps. Lastly, M. J. Wada, delegate of the Japanese Government, communicated some interesting particulars on the organisation of seismological works in that country.

In Group III. (Economics and Statistics) M. Levasseur, of the Institute, presided, the vice-presidents being MM. Meuraud, president of the Society of Com-

* Further details on the proceedings in Group I. will be furnished hereafter.

mercial Geography of Paris, Lieutenant-General Wauvermans, of Antwerp, and Colonel don Francisco Coello, of Madrid. An interesting account of the state of immigration into the province of La Plata was given by M. Alexis Peyret, president of the emigration committee of Buenos Ayres, further discussion being postponed till the morrow.

In Group IV. (Historical Geography and the History of Cartography) M. Barbié du Bocage presided, M. James Jackson being on the bureau. An important notice was read by M. Charles Marcel on Ottavio Pisani, a cartographer of the sixteenth century, and the Abbé Pisanl gave a sketch of the history of the Venetian possessions in Dalmatia, illustrating his remarks by maps showing the frontier line of Venice as determined by her treaties with Turkey and Ragusa at different periods. Group V. (Didactic Geography) only met to arrange upon a programme for the ensuing days, and receive the names of those who had communications to make.

Group VI. (Voyages and Explorations), under the presidency of M. d'Abbadie, discussed the rules which ought to be adopted by explorers in naming places discovered by them. The following advice was formulated by M. Duveyrier:—"The right of the explorer only begins when the country he is exploring has no native inhabitants," and this was unanimously adopted.

In Group VII. (Anthropology and Ethnography), under the presidency of M. le Marquis de Nadaillac, and afterwards of M. de Quatrefages, an interesting communication was read by Dr. Riedel, formerly resident at Timor, on the natives of the island of Rota or Rotti (Dutch East Indies), where the women are reputed for their beauty.

MEETINGS OF GROUPS.

Tuesday morning, 6th August.

Group I. heard a communication by Lieut.-Colonel Bassot on methods of determining latitude (see Question 1 above); Colonel Derrécagaix, Director of the Geographical Service of the Army, gave an interesting account of the advance made in preparing maps on a large scale, and advocated the use of metres instead of feet in expressing altitudes. A discussion then took place on a communication by M. Triboulet on the use of photography in making surveys, specimens being exhibited of aerostatic photography. These results showed that, however useful in giving a general idea of the position of an enemy in warfare, and the aspects of a country, no reliance could be placed on photography where accuracy was required, and that from the unstable and constantly changing position of the balloon no satisfactory views could be obtained to serve as the basis of a sketch map.

In Group III. Dr. Corrasco and M. John Le Long treated of the statistics of the Argentine Republic, specially with reference to immigration and emigration. From these it appears that in the period of thirty-two years from 1857 to 1888 a contingent of 1,374,787 persons came from different countries, and in 1888 alone the number was no less than 155,632, while for the present year the flow of emigrants to the Rio de La Plata continues in an increasing ratio. M. Charles Gauthiot, General Secretary of the Congress, communicated some particulars on French emigration to Canada, from which it appears that the number of emigrants reached last year was 1000 individuals. M. Turquan gave the results of his inquiries into the emigration of Frenchmen to foreign countries and of foreigners into France; while M. de Saint Pol Lias treated of topography as applied to colonisation.

In Group IV., History, M. Gaffarel read a paper on an anonymous Portulano of the 17th century, a specimen of which may be seen at the National Library. All the atlases of this anonymous author are remarkable for their neglecting to notice contemporary discoveries. Père Brucker read a long memoir on the maps of China

by the Jesuits, and M. Castonnet des Fosses examined the commerce of Nantes with Spain on the one side, Flanders and Bremen on the other. A discussion followed on the causes of the depopulation of Flanders.

In Group V., where M. Vidal de la Blache presided, two questions were discussed: 1. Whether the study of ethnography ought to be introduced in the higher schools. 2. Is a special professor of geography required in the faculties. Both these questions were decided in the affirmative.

In Group VI., Voyages and Explorations, M. Masqueray, Director of the *École des Lettres* of Algiers, presented a communication on the Tuaregs, his information being derived from personal interviews with prisoners at Algiers; these same prisoners were recently at the Exhibition, and Paris had the opportunity of seeing them.

In Group VII. an important communication was made by Dr. Hamy on the results of an expedition made by him and M. de la Croix in the southern part of Tunis to study the population of this region, and he described their curious dwelling-places.

At 3 p.m. the members of the Congress were invited to assemble at the Trocadero, in the *Salle des Congrès*. Hence, under the efficient guide of Dr. Hamy, they visited the ethnographical collections, their attention being called to groups of wax figures representing the peasants of every part of France, attired in their national dress, now a thing of the past. Here might be seen the shepherd of the Landes walking on stilts, with a rough sheepskin cloak thrown over his shoulders, a group of Brittany peasants with their picturesque caps, natives of Auvergne, where traces of an earlier sun worship still linger in some of their customs, Picardy peasants in holiday dress, with those from Burgundy and Normandy. In another case among the collections of M. Martin from Eastern Siberia, were charms used by the Shamans or priests, affording comparison with those found lately in North-west America, and proving an identity of origin between the people on either side of Behring's Straits. The members of this excursion then divided, one party continuing with Dr. Hamy to visit other ethnographical collections, while the greater number proceeded to the *Palais des Arts Libéraux*. Here M. Germain acted as guide, and showed the visitors the maps exhibited by the Ministries of War and Marine, the new large-scale map of France produced at the Ministry of the Interior, the statistical maps of France by M. Turquan, and the fine model in relief of the *Mont Perdu* by M. Schrader. In the Swiss section they admired the fine wall-maps engraved by the galvano-plastic process, and afterwards retouched by hand so as to throw up the mountains, giving the appearance of relief to the eminences and of depth to the valleys, the large geological wall-map of Switzerland, on which Randegger worked twenty-seven years, the splendid models in relief of the Jungfrau and Monte Rosa groups, the Lake of the Four Cantons and the valley of the Reuss by MM. Imfeld and Simon. These models of Imfeld and Simon are masterpieces of the art of depicting nature by models in relief, and their merits have been justly recognised by the bestowal of the Grand Prix on these two engineers of the Swiss Topographical Department; Heim, the father of this school, specimens of whose work are also exhibited, receiving the gold medal. From the Exhibition buildings the members of the Congress were rapidly conveyed by the little *Chemin de fer Decauville* to the esplanade of the Invalid, where in the military pavilion they were shown by Colonel Derrécaigaix an important series of maps illustrating the history of cartography in the military service of France, and the latest chefs-d'œuvre in this branch of geographical science.

An admirably illustrated catalogue was here presented to each member of our party. It contained twenty-seven plates showing at a glance the history of topography and cartography in France from the beginning of the eighteenth century to

the present time, when the methods of Cassini in his great map of France, the so-called map of the Academy, on 184 sheets, engraved on copper, have given place to the highly finished modern works engraved on zinc and printed in colours. Before leaving this subject let me say that much as there is to admire in the French cartography of the present day, particularly in the maps produced in the ateliers of Levasseur and Delagrave, the two best private publishers, the Swiss are even more successful with their galvanoplastic process of printing and in the results they have obtained by combining artistic design with mathematical accuracy.

Wednesday morning, 7th August.

Shortly after 9 a.m. most of us were assembled in our several sections, where the *ordre du jour* was proceeded with. In Group I., Mathematics, Mr. E. D. Morgan, Vice-President, in the chair, the discussion of large scale maps was resumed by Colonel Derréngaix, who had proved such an admirable guide to the maps of the *Service Géographique de l'Armée* the day before. He was followed by M. Tribouillet and others. M. Lallemand, engineer of mines, read a paper on the necessity of correcting levellings in mountainous countries, taking into account observations with the pendulum for determining the gravity of the earth. He submitted a note on the levelling operations executed in France in 1888, showing that the network had advanced 1525 kilometers during the year; assuming this rate of progress to continue, the whole of these works in France would be accomplished in four years i.e. by the end of 1892. He also reviewed the latest results obtained for ascertaining the difference in level between the Mediterranean and the Ocean, proving that the difference amounted to only one to two decimeters instead of one meter as hitherto supposed. A note by M. Bouquet de la Grye was also read. M. Venukof announced the erection by the Russian Consul Petrofsky, at Kashgar, assisted by members of the Russian Geographical Society, of a monument to Adolphus Schlagintweit, the scientific traveller employed by the Government of India in trans-Himalayan explorations, who fell a victim to his zeal in the cause of geography, being murdered by the Amir. The chairman undertook to bring this disinterested act of the Russians to the notice of the Royal Geographical Society, and expressed the belief that some suitable acknowledgment would be made. Baron Nicholas Kaulbars laid on the table copies of his review of the progress of Geography in Russia from the earliest times to the present. He had written the report expressly for the Congress, and had summarised in it all that had been done to advance geography in Russia.

In Group II., Physics, M. Wada, Japanese delegate, read a communication on the science of seismology in his country, and M. de Saussure spoke of what had been done in Switzerland in the same line. A new theory on the formation of continents was advanced by Colonel Blanchot, and discussed by Dr. Bleicher and others. Baron von Schwerin, representative of Sweden, communicated the results of his researches at the estuary of the Congo and on the West Coast of Africa, tending to show that a general rise of the land was taking place, and that the sea was retreating. Rivers are becoming less frequent, the surface of the earth is consequently growing more arid, contracting and giving way.

Group III., Economics, discussed various systems of colonisation, migrations of people from one part of a State to another, and the natural laws governing the creation, growth, and decline of towns.

Group IV., History, was engaged with Egypt of the Pharaohs, Abbate Pasha, President of the Khedivial Geographical Society, contributing a paper on the relations of the Egyptians of that period with the negro races designated in inscriptions under the name of "Kush." Père Brückner continued his communication on the maps of China by the Jesuit fathers. M. Drapeyron spoke on the first

national atlas of France, dated 1592, and M. Rouire communicated his observations on Lake Triton in Tunis during a recent expedition in that country. A short notice was also read in Section IV. by M. Teplov on the modern name of ancient Ephesus.

In Group V., Didactic, some details were given on materials useful in teaching geography, the choice of books, cartographical exercises, atlases, wall maps, panoramas, and reliefs. In Group VI. M. Timmerman gave an interesting account of the Sunda Islands (Malay Archipelago), and Dr. Kan spoke of the Moluccas. Lastly, in Group VII., the whole of the *séance* was occupied by a paper by M. Charles Rabot on the Lapp and Finn population of Northern Russia.

On Tuesday evening Prince Roland Bonaparte invited members of the Congress to his hotel in the Cours de la Reine, where a corps of Hungarian singers performed; and on Wednesday evening M. de Lesseps held a reception open to all, but it was attended by very few.

GEOGRAPHICAL NOTES.

The Paris Geographical Congress.—The Congress terminated its meetings on the 11th ult., and appears to have been successful. We give in our present issue the first part of a report of the proceedings from the pen of Mr. El. Delmar Morgan, who, with Mr. Francis Galton, represented our Society at the Congress; the other two members (Sir Frederic Goldsmid and Sir E. Ommanney) announced as delegates in our August number having been unavoidably prevented from attending.

The late Accident in the Caucasus.—The locality and nature of the accident in the Caucasus, by which Mr. W. F. Donkin and Mr. H. Fox, with their Swiss guides, lost their lives last summer, have, within the past few weeks, been ascertained with sufficient certainty by a search party consisting of Mr. C. T. Dent, President of the Alpine Club, Mr. D. Freshfield, Captain C. H. Powell, and Mr. Hermann Woolley, with Alpine guides. Mr. Freshfield, writing to us from Karaoul on the last day of July, says that on the 29th of that month the last bivouac of the climbers was discovered on a ledge of rocks about 14,000 feet above the sea, close to the icy crest which separates the glens of Daumala and the Tutinsu, and abuts on the snow cone of Dychtau (Koshtantau in the new one-verst map). Within a low semicircular wall built on the brow of a precipice were found the travellers' sleeping-bags, provisions, small parcels, a revolver, and some instruments. Everything was found as it had been left when they started to continue the ascent of Dychtau, according to the plan recorded in Mr. Fox's diary, except that the objects were buried in the hard-frozen snow which had drifted within the little enclosure. To those on the spot it was clear beyond all possibility of doubt that the accident had happened in an attempt to traverse the formidable ridge leading to the peak of Dychtau. It is a granite crest broken into many pinnacles and towers, only to be passed, if at all, by means of snow-covered ledges sloping outwards on

the face of precipices. On one of these ledges the unstable snow of the Caucasus must have fallen from under the climbers, carrying them with it to the névé below. No trace of the disaster was visible on the cliffs, and whatever had fallen to their base was buried deep beyond all possibility of recovery under the avalanches of an exceptionally snowy winter and spring. Further search was therefore of necessity abandoned. The object of the searchers had been sufficiently attained by proving the falsehood of the rumours propagated and believed in the Caucasus and elsewhere, and on the point of being embodied in an official report to Prince Dondukoff Korsakoff, that their friends had met with their deaths by violence, and also by clearing up the perplexities caused by the statement of the Starchina (headman) of Bezingi that his hunters had tracked the travellers over a comparatively easy pass into the Balkar district. This statement, which naturally imposed upon all but mountaineers, was doubtless invented to relieve the men of Bezingi of further responsibility or trouble in the search. The part of the chain where the bivouac was found is, owing to the size and complexity of the glaciers and icefalls, inaccessible to all but skilled mountaineers, and it was therefore no fault of the previous searchers that they were unsuccessful. Mr. Freshfield adds that the Russian officials at Vladikavkaz have given all the aid in their power to the search party with the greatest goodwill and promptitude.

M. Borelli on the River Omo.—M. Borelli, whose explorations in the Galla Country have been referred to in the 'Proceedings' (1888, p. 451), has addressed a letter to the Marseilles Geographical Society, pointing out the relations of his discoveries, especially with reference to the river Omo, to those of Count Teleki and Lieut. Von Hoënel, whom he met at Cairo on his way home. M. Borelli concludes, from the conversations he had with the other two explorers, that the Lake Basso-Narok is the same lake which he located to the southward as receiving the waters of the river Omo, and which has been generally known as Lake Samburu. As a matter of fact, the lake receives on the north a river named Niannam, which M. Borelli maintains is his Omo; it also, he states, receives another named *Bass*, which MM. Teleki and Hoënel have not seen. They saw on the N.N.E. mountains named Aro, which are those named Ara or Aro by M. Borelli. He also points out that several peoples referred to by MM. Teleki and Hoënel, are identical with those heard of by himself further north. The main point, however, is, that Samburu, or Basso-Narok, or Prince Rudolph, are one and the same lake. If so, M. Borelli's Omo does not belong to the Nile system, but discharges into the lake, which has no outlet according to MM. Teleki and Hoënel. They state that the Samburu has an altitude of 1970 feet above sea-level, while that of Victoria Nyanza is about 3800 feet. M. Borelli is therefore convinced that Lake Samburu forms an inland basin quite distinct from that of the Nile.

M. Camille Douls, the Saharan Explorer.—This adventurous young traveller has met with a sad fate on a second attempt to penetrate the Western Sahara, news having reached France of his assassination in the interior. His former attempt was made in a peculiarly daring manner: after qualifying himself by studying the language and manners of the tribes, he induced some fishermen of the Canary Islands to land him alone, in the guise of a Mussulman, on the desert coast near Cape Garnet, where he soon fell into the hands of a nomad party, and, after a narrow escape, was received into the tribe, and travelled with them over a great part of the Western Sahara, finally escaping through Morocco. He came to London after his journey, in the autumn of 1887, and published a narrative of his romantic adventures in the *Times* newspaper. He also exhibited to the officers of our Society the somewhat rude route-maps of his wanderings, which embraced wide tracts of country of which previously nothing was known. His object then was to obtain funds to enable him to undertake another journey, which he afterwards succeeded in doing in Paris, whence he started in June 1888 on the expedition in which he has met his death. He was only twenty-five years of age, having been born at Bordes, in Aveyron, in 1864. The news received leaves little doubt as to his death. The disguise of a Mussulman, and the name El-Hadj-Abd-el-Malek, under which he travelled, identify him as the traveller reported to have been murdered by his guides in the Sahara between the oases of Alonef and Akabli, 900 kilomètres south of Oran. He was going from Tangiers by the Tafilet, probably with the object of reaching Timbuktu, and was killed from motives of fanaticism or cupidity, it is unknown which. In a letter to a friend dated from Tangiers shortly before he started for the interior, he wrote with some misgiving as to the future, but announced his intention of marching bravely forward in the face of any difficulties, desirous of emulating the glorious deeds of René Caillé, the well-known Saharan explorer, nearly seventy years ago.

Exploratory Work in West Equatorial Africa.—The work of detailed exploration of the German part of the Gold Coast continues to be carried forward by Captain von François, Dr. Wolf, and others. The former made during the first three months of the present year another journey to Salaga via Kpandu and Kratji, which, together with a series of short excursions across country, has furnished new data for a complete map of this region, which is about to be published. The height of Adaklu, which Dr. Henrici put down at about 10,000 feet, is now stated to be only 2690 feet.—Dr. Wolf conducted a military expedition to the country of Kebu in January last, and reports the region to be picturesque, well-watered, and mountainous, and apparently suited for plantations and cattle-rearing. Further south, Dr. Zintgraff has, according to the latest news, reached Ibi, on the Benue, on his journey to Adamaua from

Barombi Station, while his colleague, Captain Zeuner, made a short excursion to Bioko on the Upper Massake. Further progress to the north and north-east was impracticable, as the natives reported the country to be mountainous, and uninhabited for a long distance.

Discovery of Gold in Lower California.—Sir F. Denys, our Consul at Mexico, in reporting to the Foreign Office on the recent discovery of gold at Santa Clara, states that the gold district lies in the north-east portion of the peninsula of Lower California, 60 miles east of Ensenada; it is situated about 4500 feet above the sea-level. It commences at the foot of the mountain range which forms the backbone of the peninsula, and runs in a north-east direction for 50 miles or more. Within it are many cañons or gulches, in the lower levels of which placers are found, while quartz lodes of a mineral character intersect the hills in every direction. The Consul is somewhat sceptical as to its profitable working. Various other minerals, such as silver, copper, lead, iron, sulphur, salt-petre, &c., are reported as found there.

The Dissolution of the "Afrikanische Gesellschaft in Deutschland."—It is announced in the current number of Petermann's 'Mitteilungen' that the German African Society, which has been in active operation for the last fifteen years, has now ceased to exist. Since the German Government decided to apply the sums voted by the Reichstag, to the scientific exploration of the German Protectorate and to carry out this task itself, the society could no longer find the means for equipping independent expeditions. That its share in the work of opening up Equatorial Africa has been considerable, is shown by the following summary of its many successful operations:—the first accurate survey on the Loango coast, Dr. Lenz's expedition up the Ogowé, the complete opening up of the South Congo basin by Pogge, Schütt, Buchner, Wissmann, Kund, Tappenbeck, Wolf, and Büttner; the crossing of the Sahara to Timbaktu by Dr. Lenz; Flegel's further exploration of the Benue, and his journey to the south; Rohlfs' Kufra expedition; the surveys in Abyssinia, executed by the last-named traveller in conjunction with Stecker; the East African surveys of Dr. Kaiser; and, lastly, the exploration of the region between the Luapula and the Lualaba by Dr. Böhm and Herr Reichard.

Introduction of Economic Plants into Jamaica.—In the Report on the Blue-book (1887-8) on the island, the Director of Public Gardens and Plantations calls attention to the propagation at Castleton of the manilla hemp plant, with a view to its introduction into different parts of the island, and points out that, even if the fibre is not utilised as an article of export, it may supply a local demand for rope, and so save such a valuable timber tree as the "mahoe," of which a large number are annually destroyed by the peasantry by being stripped of their bark, which is twisted into rope. Another interesting matter, alluded to by him, is

the successful experiment of grafting the mangosteen (which, although growing at Castleton for many years, has only recently reached the fruiting stage) upon the "gamboge" tree of common growth. At the cinchona plantation actual cultivation has ceased so far as planting operations are concerned, but a hill garden has been established. During the year useful work has been done by the Department in the distribution and collection of valuable economic plants. Cacao-growing is now a very promising young industry. It had been a prominent one in the earliest days of the English occupation of the island, but completely died out, and has within very recent years been revived.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—June 21st, 1889: M. MILNE-EDWARDS, of the Institute, in the Chair.—M. Venukoff communicated the following news, which had just reached him, as to the progress of certain Russian expeditions. Colonel Pievtzov was on the 26th May at Yarkand, whence he intended to set out for the north-west part of Thibet. About the same date M. Grum-Grjmailo was expected to arrive at Kashgar; it was possible that he would not be able to continue his journey into the eastern part of Chinese Turkistan, as he was not provided with a Chinese passport. Towards the end of May, M. Grombtchevsky was at Daraut-Kurgan in the Pamir region, and on the point of entering Shiguann. The latter district, together with Wakhan and Badakshan, had, however, been again taken possession of by the Afghans, and the native potentates had fled. The question of Trans-Asiatic railways was now being definitely discussed by the Imperial Council at St. Petersburg. The scheme comprises only two lines, viz. that of Russian Turkistan, between Samarcand and Tomsk, and that of Siberia, between Zlatoust and Vladivostok. The two lines would cross at Tomsk; their total length would be nearly 7500 miles, including 900 miles already constructed between Samarkand and the Caspian.—The Chairman announced the recent arrival in Paris of M. Pavie, French Consul at Luang Prabang. He said that M. Pavie had for three years been exploring the north of Siam and the Laotian provinces, with the view of finding the easiest routes between those regions and the sea. He had discovered a route which could be traversed in nine days, four of which would be occupied in navigation, and five on horseback, thus connecting the commercial centres of Siam with the French possessions in Tong King. It was hoped that M. Pavie would be able to give an account of his travels to the Society next November.—The special meeting, which was to have been held on the 26th June in the Sorbonne to welcome Captain Binger, had to be postponed.

Geographical Society of Berlin.—July 6th, 1889: Baron von Richthofen in the Chair.—Captain Kund gave a brief résumé of the results of the two expeditions led by him into the country lying inland from the Batanga coast, in the Cameroons district of West Africa. The opposition which the coast population offered to the entry of the expedition was only passive, but nevertheless very irritating. All kinds of stratagems, lies, deceptions, and false directions as to routes—of course to no purpose—were tried by them. It was owing to the calumnious reports spread by the inhabitants of the coast, that the expedition, as it penetrated further into the interior, encountered hostility from the natives, who, made uneasy by the reports,

to them by traders from the coast became fearful, as the white men approached for their wives and stores of ivory. The violent attack made upon the expedition, by the Bekok on the first return to the coast in the spring of 1888, rendered it absolutely necessary, in order that the prestige of the white man in these regions should be maintained, for the party to return again as soon as possible to that part of the country. For the news had spread far and wide that the natives had succeeded in killing the white men, and in destroying the expedition. The reappearance of the supposed dead men was consequently a great moral success, and the second advance presented hardly any difficulties; among many tribes the expedition was even received with songs and dances, and everywhere the suspicion that the expedition had come for the purpose of taking vengeance, quickly disappeared. Captain Kund, on this occasion, announced most emphatically that nothing was further from his intentions than to take any unfair advantage of the natives, that he had left no stone unturned in order to convince them of his peaceable intentions, and that the first shot had never been fired from his side; it was continually the want of interpreters which caused the complications in which on different occasions he became involved with the natives. Although the second journey resulted in little that is new from a geographical point of view, inasmuch as the route followed differed in unimportant points from that taken on the first occasion, still the detailed knowledge of the country was considerably increased, and a much more complete insight into the ethnographical conditions of the region was obtained. Thus the expedition became acquainted with a race of people, which on the first journey had remained quite unknown. The inhabitants of the primeval forest region are of remarkably small stature, although not dwarfs, and are yellow-skinned; they roam through the forests, without having any fixed abodes, and live by the chase. These people appear to represent the aborigines of the country, who were the first to make paths in the virgin forest. They call themselves the Bojaëli, but are named Baïëa by the other tribes. They kill elephants with spears, and possess extraordinary skill in finding their way through the dense forest. The ethnographical features of the southern Cameroons territory, between the Sannaga and the Campo are, according to the present state of our knowledge as follows. Between the Sannaga and the Njong dwell the important group of the Mvëlle (Bakoko), who are very unequally distributed through the region of primeval forest as far as the coast range of mountains. The coast itself is here uninhabited. South of the Njong, the Banóko and Bapúko (the so called Batanga people) live on the coast. They have probably come here from the north. In the rear of them dwell the Kasjua, called by the Batanga people Mabéa. They belong to another race, and have probably immigrated from the south. The inhabited part of the coast is, with the exception of the banks of the Njong and Lokundje where narrow belts of population—on the former the Bakóko, and on the latter the Kasjua and Bakóko intermingled—extend into the interior, nowhere broader than about 9 miles. Then follows the uninhabited region of primeval forest about 120 miles broad, in which only the Bojaëli live. In the valleys of the first steep mountain range, the Ngumba live; they call themselves Mavumba, and are closely related to the Kasjua, having probably in the same way immigrated hither from the south. In the north they border at the Lokendje River, on the Batóko, in the south on the Buléi. The latter belong to the Fang group, and have pushed their way along the right bank of the Ntembe (Campo River) almost as far as the coast. They embitter the lives of the Ngumba people by constant attacks. East of the Ngumba territory, the country for a stretch of about 45 miles is again uninhabited, and it is there that the second steep ascent to the great plateau of the interior of Africa commences. The plateau itself is extraordinarily densely populated, and by people closely related in their language to the Fang (Mpangwé,

the Fans of Du Chaillu) on the Ogowe. Some porters belonging to the latter race accompanied the expedition, and they very quickly learned to make themselves understood by the people of the plateau. The sequence of tribes from the left bank of the Sannaga is as follows:—the Jetoni, Botinga, Kolle, Jetudi, Jeundo, Bane, Tinga, Baba, Janguana, and Bulei in the south. The Jeundo and Tinga are distinguished in the most favourable manner from the peoples living further west. They are of remarkably tall and slim stature, are well-nourished, and thoroughly healthy. Their features are, in the case of both sexes, extraordinarily regular. They have a marked tendency to harmless gaiety and dancing. The men wear round the loins a piece of bark cloth; it is peculiar that the women for covering their back parts use large bunches of grass threads coloured red-brown, while their front parts are barely concealed by a banana leaf. In the midst of this interesting people, at a point situated under $3^{\circ} 48'$ north lat. and about 12° east long., and close on the boundary line between the Bantu and Sudan negroes, the expedition erected their station, at which Lieutenant Tappenbeck is at present time stopping alone.—Professor Schweinfurth then spoke upon his journey to Arabia Felix, undertaken from Nov. 1888 to March 1889, with the object of making botanico-geographical studies. Stimulated by a journey of the French botanist A. Desfiers in the year 1888, Schweinfurth determined to make one of the chief objects of this journey to Yemen the obtaining of authentic specimens of a large number of the species of plants, described by the Swede Peter Forskal, the botanist of the Niebuhr Expedition (1761), who, when barely twenty-seven years old, fell a victim to the climate after much ardent activity in exploration. For what reason the scientific world, considering the complete opening up of this ancient land of civilisation, has deferred so long the exploration of the country it is difficult to understand, since Yemen, not only since the recent taking possession of the country by the Turks but for a long period, has been distinguished, above all other parts of South Arabia, for the safety of travel and the well-tested courtesy of the inhabitants towards Europeans. Several plants, useful to man and cultivated by him, have, through the medium of South Arabia, found their way to the civilised countries of the north; some, like coffee, appear to have been converted here for the first time from their natural state into the service of man. In ancient times there were in the first place various fragrant substances exported from here. On that account the country was named, from the oldest dynasties of the Pharaohs down to the later Roman period, the holy land, the land of the gods. The Punt country of the old Egyptians is surely not only to be looked for in Africa, but denotes in the wider sense the territory on both shores of the southern part of the Red Sea. The designations “stair” mountain and “step” mountain, both in the old hieroglyphics, as well as in Ptolemy and in the works of Arabian geographers, Yakut and Hamdany, refer especially to the terraced cultivated slopes of South Arabia, constructed with such a large expenditure of labour, while they possess no meaning if applied to the Somali country. The ancient Egyptians took special care of certain trees, which were dedicated to particular deities. Thus the sycamore tree was consecrated to Hathor. From the oldest tombs found in the Pyramids and belonging to the Fourth Dynasty down to the latest lists of offerings of the Ptolemaic-Roman epoch, the fruit of the persea (*Mimusops schimperi*), the “aschd,” appears as a continually recurring gift to the gods and to the departed. The tree was regarded as specially sacred, and was dedicated to the greatest god Rê, the sun, and on numerous occasions the leaves and fruit of both trees have been brought from the tombs to the light of day. The foreign origin of the tree called *Persea* in the Grecian authors, not to be confounded with the *Persea gratissima* of to-day, as coming from Ethiopia, by which term Abyssinia as well as South Arabia may be understood, is attested by Strabo and Diodorus, and confirmed by the present wide-

spread existence of wild-growing species. For several centuries the tree has entirely disappeared from Egypt. On the other hand, the sycamore, although only in a cultivated state, is still to be found in Egypt and certain parts of Syria. Schweinfurth has now discovered in Yemen in numerous places fig-trees, in the case of which he has proved botanically that these trees, called in the mountainous country *chanes*, and in the lowlands *burra*, are completely identical with the Egyptian sycamore. At the same time the traveller found, in the lowest mountain regions of Yemen, the *Persea* of the ancients growing wild, and it was there designated with the old Arabic name *lebbach*, which was known to the Arabian geographers of the Middle Ages. The *Mimusops schimperi* was formerly only found in North Abyssinia. With the disappearance of the tree in Egypt, for the protection of which the Emperor Arcadius made a special law which is still preserved, there disappeared in later Egypt also the proper meaning of the name *lebbach*, and at the commencement of the last century the term was transferred to a species of acacia (*Albizia zebbell*) introduced from India, which is to-day the most widely spread tree in Egypt. In connection with the traditions inscribed on the ancient monuments, the fact that in Yemen to-day there are still species of trees growing wild, which several thousands of years ago and during a period of 3000 years were held in Egypt to be sacred as symbols of divine worship, throws important light upon the old relations subsisting between the two countries.—Privy Councillor Dr. Radde then gave a sketch of his career as an explorer, and of his travels in Asia from 1855 to 1888.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Baddeley, M. J. B.—Thorough Guide Series. The English Lake District. With maps, general and sectional (corrected up to date from the Ordnance Survey) By J. Bartholomew, F.R.G.S. Fifth edition, revised and enlarged. London, Dulau & Co., 1889: 12mo., pp. xxix. and 249. Price 5s. [Presented by Messrs. Dulau & Co.]

Baedeker, K.—London and its Environs. Handbook for Travellers. With 3 maps and 15 plans. Seventh edition. Leipsic, Karl Baedeker; London, Dulau & Co., 1889: 12mo., pp. viii, 360, and 45. Price 6 marks. [Presented by Messrs. Dulau & Co.]

——— Switzerland and the adjacent portions of Italy, Savoy, and the Tyrol. Handbook for Travellers. With 38 maps, 11 plans, and 11 panoramas. Thirtieth edition. Leipsic, Karl Baedeker; London, Dulau & Co., 1889: 12mo., pp. xxviii. and 490. Price 8 marks. [Presented by Messrs. Dulau & Co.]

These editions embody the latest information obtainable on the places treated. To the Handbook for Switzerland new maps are added of the Pilatus and of the valleys of Ormont; besides new plans of the towns of Bâle, Zürich, Lucerne, Geneva, and Lugano.

Locusteanu, Const. I.—Societatea Geografică Română. Dicționar Geografic al Județului Romanai. București (Bucharest), Socceș & Teclu, 1889: 8vo., pp. 219.

Ward, C. S., and Baddeley, M. J. B.—Thorough Guide Series. South Devon [including West Dorset Coast] and South Cornwall, with a full description of Dartmoor and the Scilly Isles. 17 maps and plans by Bartholomew. Third edition, revised. London, Dulau & Co., 1889: 12mo., pp. xvi. and 224. Price 4s. [Presented by Messrs. Dulau & Co.]

ASIA.

[India].—General Report on the Operations of the Survey of India during 1887–88. Calcutta, 1889.

This department was, during the year, under the charge of Colonel H. R. Thuillier, R.E., Surveyor-General. Its operations included some secondary triangulation along the Madras coast, and two chains of triangulations carried from the Great Indus Series into Baluchistan so as to converge at Quetta. Six parties were engaged on topographical work, by far the greater portion of this being on the half-inch scale; various parties and half parties continued to survey forests in different provinces, the aggregate areas being 354 square miles on the 4-inch scale and 539 square miles on the 8-inch scale. No fewer than seven parties in the Central Provinces, North-west Provinces, Assam, Burma, and Lower Provinces of Bengal were engaged on cadastral survey, the total completed area of which was 5435 square miles. Traverse surveys, designed mainly as frame works for the incorporation of village maps, were also carried forward in the Central Provinces and the Punjab, the out-turn being 20,082 square miles as against 16,661 square miles accomplished during the previous season. The telegraphic longitude operations which had been suspended owing to the paucity of officers, were resumed, and seven arcs of longitude were measured between trigonometrical stations in Southern India. These are particularly interesting from a geodetic point of view, as furnishing corroborative evidence on the existence of an excess of gravitation towards the ocean surrounding the peninsula of India. Tidal observations by means of self-registering tide gauges were taken at eighteen stations in India, Burma, Ceylon, Aden, and the Andaman Islands. Two observatories (Negapatam and Elephant Point) were dismantled, and two new ones, Tuticorin and Princes Dock, Bombay, have been established; while in connection with these operations, spirit-levelling lines were carried out from Madras to Vizagapatam and from Chinsurah to Nuddeah, along the right bank of the Hooghly river.

Under the head of geographical surveys and explorations the work done by Major Hobday's party on reconnaissance surveys in Upper Burma calls for mention, most of this having been done in connection with various military expeditions undertaken for the pacification of the country. Captain Jackson, R.E., accompanied the expedition to the Southern Shan States and carried on a survey from Fort Stedman down the valley of the Balu Chaung to Pekon, whence he advanced across the Pon and Tein rivers to Maukme and the Salwen river and thence northwards to Thibaw. He succeeded in mapping more or less completely about 4500 square miles of country on the quarter-inch scale. In the Northern Shan States about 3500 square miles was surveyed on the same scale, and materials have thus been obtained for a valuable map of the Cis-Salwen Shan States. Surveyors were also detailed to accompany the columns proceeding into the Yaw country and Mogaung, and a large scale survey of the Ruby mine tract has also been made. As the result of the year's operations in Upper Burma, triangulation has been extended over an area of 23,000 square miles, and nearly 21,000 square miles have been surveyed and mapped on the quarter-inch scale.

The expedition under Mr. J. F. Needham to explore the routes leading from Upper Assam to the Hukong Valley in Upper Burma was accompanied by Mr. J. Ogle, who completed the survey of 1500 square miles of unknown country lying to the south of the Patkoi range, which he connected with work done previously by Colonel Woodthorpe to the east. The expedition has also established the practicability of direct communication from Assam to Burma over the Patkoi Pass by either of the two routes explored.

Captain Wabab's work with the Black Mountain expedition has already been noticed in the 'Proceedings.' An assistant surveyor, Yusuf Sharif, R.E., was deputed in October 1887 to join the Afghan Boundary Rectification Commission under Colonel Yate, C.S.I., and on the completion of his duties there he availed himself of the opportunity of his return journey to India to survey certain routes. He succeeded in surveying about 4600 square miles of new country which forms a valuable addition to our knowledge of Afghanistan.

The account of the journey has been separately printed, and the Government of India have awarded Yusuf Sharif a *khilat* of Rs. 3000 for his work.

On the northern frontier of India exploration work was confined to a rough triangulation and reconnaissance of Western Nepal from the Kumaun boundary to the Gandak river.—[C. E. D. B.]

[India].—Report on explorations in Sikkim, Bhutan and Tibet. Dehra Dun. 1889.

This report deals with five different explorations made by natives of India, most of them within the last nine or ten years. The first is a collection of brief notes on the Lower Tsangpo by a Mongolian Lama Serap Gyatsho. These, however, are old and of no particular interest, except as corroborating the later researches of K — P, or Kinthup. This latter explorer's work was briefly described in last year's 'Proceedings,' and consisted in an exploration of the Tsangpo to a point within 35 miles of the British frontier. In the present report we are furnished with a graphic account of the surveyor's troubles, which appear to have been considerable. He made his way over the Donkhya La pass to Gyantse, which he left disguised as a pilgrim, carrying *khurshings* or cradles for packs. Lhasa was reached on the 1st September. From thence Kinthup made his way through Chetang to Gyal Singdong whither the furthest exploration up to that time had extended. Here are the remains of three old monasteries, and the river falls from a height of about 100 feet into an unfordable pool. The Tsangpo is crossed by wooden and leathern boats in winter, but in summer travellers are swung across by a double rope. At Pema Keichung, about 10 miles further down, the river falls from a cliff 150 feet in height, into a wide lake over which rainbows are continually to be seen. Finding no road beyond, Kinthup and his companions retraced their steps to a place called Tongjuk Jong, north-east of the great bend formed by the Sangpo, where passports are examined. Here Kinthup's companion, the Lama, behaved very treacherously, and decamped, having sold Kinthup to the Jongpen, in whose house the explorer was detained for more than two months, and compelled to stitch clothes. He eventually escaped and descended the river to a place called Bepung, where he manufactured the 500 marked logs, all one foot long, which he had been ordered to make by the late Captain Hurman, with the view of floating them down the Tsangpo. His subsequent wanderings are difficult to follow, as the map illustrating them is a mere sketch map of the lower Tsangpo, but he appears to have proceeded in a generally north-westerly direction through Tsari to Lhasa, where he got a Kazi of Sikkim to write a letter to the Surveyor General, reporting his arrival there, and his intention of casting the marked logs into the Tsangpo, at the rate of 50 logs per diem, from the 5th to the 15th of tenth Tibetan month of the year called Chuluk, of the the Tibetan calculation. This letter was apparently taken to Darjeeling by the Kazi's wife; but we do not gather whether it was ever received, or what the result of the log-throwing experiment was, although Kinthup reports that he duly returned by a round-about route to Bepung, and performed his part of the transaction. He then claims to have travelled southward, following generally the course of the river to Miri Padam, which was represented to be 35 miles from the British boundary. He eventually returned to Darjeeling by way of Lhasa, after four years and three months' wanderings.

The next report is that of Lama U. G., an employé of the Bengal Educational Department, who had made two previous journeys in Tibet in company with Sarat Chandra Das, whose narrative of his journey to Lhasa was published some years ago. U. G.'s original MS. account of his present journey was written in English, but in consequence of the quantity of legends, traditions, &c., with which it was interspersed, it has been re-written in an abridged form by Colonel Huldich. The Lama was previously instructed to read a prismatic compass, and to find his altitude by hypsometer, and he had also received full hints from Mr. Macaulay, Secretary to the Government of Bengal, as to what information it was most desirable to obtain. He had made arrangements for taking with him medicines and funds for the journey, as well as cloth, needles,

tobacco, &c., as merchandise. The duration of the journey was only 6½ months, but during that time the Lama, accompanied by his wife, travelled from Darjeeling, via the Donkhyia La pass, Khamba Jong and Gyantse Jong to Shigatse and Tashi Lhunpo on the Tsangpo river, thence eastward to the Yamdok-tso or Lake Palti, which up to the time of the Lama's survey had been represented as a symmetrically ring-shaped lake. Its true shape is now likened to that of a scorpion. From the western shore a mountainous peninsula projects north-eastward into the large expanse of the lake, being connected with the mainland by two arms which themselves enclose a second and smaller lake called the Dumu Tso. One of the arms consists of a precipitous and impassable mountain ridge; communication is consequently carried on by the other arm, between the grassy plains of the mainland and the towering mountains of the peninsula, which are dotted with monasteries. Here U. G. was entertained with hospitality after a first fierce reception by huge Tibetan dogs, and much questioning as to his business. The smaller lake, Dumu Tso, impressed him greatly; its deep, still waters embosomed amongst mighty cliffs, the silence which hung over the stupendous crags which encircled it, broken only by the hoarse roar of falling masses, which ever and anon thundered down the mountain side into its depth—all struck his superstitious mind with unwonted awe.

The Lama then travelled southwards, past the Pho Mo Chang thang tso Lake, to the Upper Lhobrak, which he has been the first to survey, identifying it with the Manas river of Assam. At Lhakhang Jong, on the Bhutan frontier, U. G.'s packages were examined by Tibetan officials, who overhauled his instruments, botanical specimens, books, maps, &c., discovered his object in travelling, and decided to refer the case to Lhasa for instructions, as very strict orders had at that time been issued by the Tibet Government against allowing explorers to make maps of the country. But by means of a few judicious bribes, and through his skill in meeting the cross-questioning to which he was subjected, he finally managed to extricate himself from this difficulty. On the whole the Tibetan officials seem to have behaved with most remarkable moderation. They knew perfectly well that he was an explorer, yet they returned him all his property uninjured (except his fair note-book, which was destroyed), and even furnished him with a free pass as far as their jurisdiction extended, having let him go with nothing further than a promise that he would not visit Lhasa, and that he would carefully conceal all the circumstances of his arrest and release.

His route next lay north-eastwards by way of the Tigu Tso to Chethang on the Tsangpo river, over country previously unknown, and then to Lhasa, where he seems to have been well received by the Nepalese agent, although relations between the Governments of Tibet and Nepal were rather strained at the time. The Lama made a rough survey of the city of Lhasa, which he found was 9500 paces round, and collected a good deal of information respecting the Government and social and religious customs of the Tibetans. U. G. then returned homewards, skirting and mapping the outer edge of the Yamdok Tso Lake, by way of the Bam Tso Lake, the Tang-la Pass, and the Chumbi valley to Darjeeling.

The last two narratives in the Report are those of R. N. and his companion P. A., whose explorations of Sikkim, Bhutan, and Tibet, were commented on in the Survey Report issued last year. The maps accompanying these various narratives are the following:—

- (1) Sketch map to illustrate Colonel Tanner's memo. on course of the Sangpo. From information supplied by K. P. in 1886-87.
- (2) Sheet No. 6 of North-Eastern Frontier, Parts of Tibet, Sikkim, and Bhutan. Scales 8 miles to 1 inch.
- (3) Sheet No. 7 of North-Eastern Trans-Frontier, Sikkim, and Bhutan, with parts of Nepal, Tibet, and adjacent British Territory. Scale 8 miles to 1 inch.—[C. E. D. B.]

Mac Mahon, [Major-Gen.] A. R.—Karenni and the Red Karens. 'The Asiatic Quarterly Review.' July, 1889: pp. 144-167, 8vo.

[Russia in Central Asia].—Is Russia vulnerable in Central Asia? 'The Asiatic Quarterly Review,' July, 1889. Pp. 64-81. 8vo.

Scott, J. George.—The British Shan States. 'The Asiatic Quarterly [Review],' July, 1889. Pp. 1-47. 8vo.

AFRICA.

Carvalho, Henrique Augusto Dias.—L'influence de la civilisation et de la colonisation latine et surtout portugaise en Afrique. Lettre à sa Majesté le Roi des Belges. (The influence of Latin, principally Portuguese, civilisation and colonisation in Africa. Letter to His Majesty the King of the Belgians.) Lisbonne, Impr. Franco-Portugaise, 1889, pp. 70.

A publication in reference to the International Conference, convoked by the King of the Belgians, in opposition to slavery in Africa. M. Carvalho describes what slavery is in the countries between the 5th and 12th parallels of S. lat. and between the 16° and 24° E. long., in which region he was travelling, as chief of the Portuguese expedition to Lunda, between 1884 and 1888.

In these countries the slave, in the exact sense conveyed by the word in European languages, does not exist. The people who have come from the north call themselves Ambundu ("invaders"), those from the south Aruru or Alulu, i. e. "the people who dwell afar off, where the rivers rise"; and because they were the peoples invaded, "the prisoners of war." Each one of them, serving the invaders, is a Mubeka or Mubika, "he who carries." The interpreters have wrongly translated Murnru and Mubika "slave."

The Mururu may be sold or given, but forms part of the family; he discusses his affairs, divides his property, may change his family, and may, by payment, pass to a higher class in his tribe. The state of Mururu takes the place of capital punishment, and therefore represents social progress. There are some of these people who at the present time even buy Aruru, but who never sell them.

M. Carvalho never saw handcuffs, throat-bands, or instruments of punishment or torture used against them.

Civilised nations, by trading for the Mururu, made the "slave." The native chiefs then began to find it profitable to sell the Aruru, and left all other industries to follow this one.

Afterwards the Portuguese abolished slavery, and the Portuguese authorities have completely done away with it up to the Kwango. Special officers watch over liberty and the righteous fulfilment of contracts. Many natives at the present time come to beg for work in Portuguese houses, and, being taught therein, have become landed proprietors and merchants. They now go to Lunda in search of carriers and women (in exchange principally for salt, which is not found to the east of the Kwango), and these become entirely free once they enter territory under Portuguese influence, but at the present time remain, as a rule, with those who buy them, as forming a contented part of the family.

In the interior of Lunda the Aruru are now sold and given as an article of commerce. The German Expeditions of 1875, 1877, and 1880 followed local customs precisely, and accepted negroes in exchange. Their carriers bought women and boys, which they afterwards brought to Malange.

Since the constitution of the Congo Free State (1884), the prisoners of war are sold as slaves to Tippu Tib and his companions under the protection of the said State, and are conveyed with hands bound and chains on their necks to the East Coast.

M. Carvalho proposes to the Free State to copy the Portuguese administration in the liberty which it guarantees to the natives in its territories, and says that it is not force which will regenerate Africa.

M. Carvalho says that the English have been one of the powerful enemies of the negro race, "drawing it away from its society under pretext of civilisation, and even going the length of expelling whole tribes from their countries." The other great enemy, the Arab, provides himself, nowadays, with slaves in the Congo Free State.—[B. R.]

The Congo.]—The Congo Railway from Matadé to the Stanley Pool. Results of Survey. First Draft. Conclusions, with 24 schedules, maps, plans, estimates, several notes. Brussels, Weissenbruch, 1889: 8vo., pp. 126.

This brochure is issued by the "Compagnie du Congo," who have been the chief agents in carrying out the survey for the railway, which, as has already been pointed out in the 'Proceedings,' will run at some distance from the south bank of the river for a length of 272 miles. The survey, we are assured, has been attended with the most favourable results. Only the first 16 miles, it is stated, will be attended with any important difficulties; while the remainder of the line may be laid under exceptionally easy conditions, both along the plains and along the hill-sides in curves of great radius. In the first 16 miles there will be considerable cuttings in rock, while further on the cuttings will be mostly through sandy and friable earth. In the first 16 miles, moreover, somewhat extensive aqueducts will be necessary to carry off the water; after that, the Report states, there will be few constructive works, the most important being a bridge of 310 feet across the Mkissi, two bridges of 250 feet across the Mpezo and Imllu, and six bridges varying from 120 to 200 feet. All the other bridges will be very much smaller. The maximum of incline will be 46 millimetres per metre, and will be reached three times during the first portion. During the last 250 miles the inclines are very infrequent and insignificant. Curves of short ravines are rather frequent in the first section. The rail gauges will be 30 inches. The locomotives when loaded will weigh 30 tons, and drag at the rate of 11 miles an hour an average load of 50 tons. The capacity of transport, it is stated, is superior to any traffic to be expected for a long period; as one train per day represents a total movement of 36,000 tons; if necessary a service of eight daily trains could be organised without difficulty. The starting point of the railway in the Lower Congo will be Maladi, which it has been found can be easily reached by sea-going steamers. The terminus of the railway at Stanley Pool will be at Ndolo, at a little distance above Kinchassi, and also above all the rapids which hinder navigation in the Cataract region. Beyond this point, including the Congo and its affluents, it is estimated that there are 7200 miles of uninterrupted navigation for small steamers. Between the terminus and here will be four stations. As the trains will not travel by night, it will take two days to do the distance between Matadi and the Pool; a distance which at present takes one month. The Report then goes on to give a glowing picture of what may be expected from the railway in the development and civilisation of the whole of the Congo region. There are numerous plans, sections, and estimates, all of which are useful.

Nachtigal, Dr. Gustav.—Sahara and Sudan. Third part, published by E. Groddeck. (Sahāra und Sūdān, von Dr. Gustav Nachtigal. III. Theil, herausgegeben von E. Groddeck.) With portrait, map, two Arabic letters, and index. Leipzig, 1889.

When Dr. Nachtigal died, in 1885, after having brought out only two parts of his great work 'Sahāra und Sūdān,' it was doubtful whether the third part, which had to deal with the most interesting portion of his journey, from Bornu viâ Wadai and Dar-for to Egypt, would ever see the light. It appeared, however, that many years since the great German traveller had dictated to a shorthand writer a full account of his journey from Kuka to El-Obeid, as well as the chapters devoted to a general description of the visited regions, and this MS., carefully revised, is now brought out by Mrs. E. Groddeck, to whom Dr. Nachtigal had bequeathed the completion of his work. Mrs. Groddeck, who herself is no stranger to Africa and with whom the deceased traveller often consulted about his work, has acquitted herself in the most excellent way of the task imposed upon her. She carefully revised the MS. and completed it from the traveller's note-books and numerous separate notes, and at the same time she has carefully maintained the personal character of the narrative.

Numerous reasons prevented Dr. Nachtigal from giving the final touch to the third part of his work, but one of them was the doubt he entertained about the

Kuta river. He did not doubt its being a continuation of the Welle river, discovered by Dr. Schweinfurth, which is now known to be one of the chief tributaries of the Congo; but he did not know yet that between the 19th and 20th degrees of E. longitude it suddenly changes its western course into a southern one, and he proposed to make from Tunis (where he was German consul) a new journey to the Sudan before publishing the last part of his work.

The map which accompanies the now published volume, is on the scale of 1 to 5,000,000, and comprises the region between Lake Fitri and Khartoum. It was drawn by Dr. Nachtigal, but has been corrected according to the fresh data as to the Marra Mountains supplied by the new maps of the Egyptian General Staff. All proper names in the work have been revised by Consul Dr. Wetzstein, and Dr. Nachtigal's transcription of Arab names has been maintained throughout. Besides, the work contains a portrait of Dr. Nachtigal, a general index to the three volumes, and an index of all names of plants mentioned, revised by Professor P. Ascherson. As to the most valuable linguistic materials which were collected by Dr. Nachtigal during his journeys, they have been put in the hands of Herr R. Prietze, who will bring out separately the results of his philological studies.

The volume which we now have before us begins with a description of the winter of 1872-3, which was spent at Kûka,* the fears entertained by the inhabitants in consequence of the rising of the waters of Lake Tsad, which inundated Ngornu and several small hamlets, and the consequent foundation of a new capital, Cherfa, to the N.N.E. of Kûka. It was only on March 1st, 1873, that Nachtigal left the capital of Bornu and started for what was considered as the most perilous part of the journey, towards El-Fâscher, 670 miles distant. On March 16th the party crossed the Bahâr-el-Ghazâl, but although the river was full of water it was impossible to ascertain its course for a greater distance, its banks being covered with a thick growth of trees. The traveller followed its course for a couple of hours, but soon abandoned it to pursue his route eastwards. Five days later they reached the neighbourhood of Lake Fitri, which is nearly deserted during the rainy period on account of the terrible pest of flies, which compels both men and animals to fly away from its wet shores; and on April 5th the party sighted the Kondongo Mountains, which run south-west to north-east. They crossed them through a passage at their northern end, and soon were in Abesche, the residence of the ruler of Wadâi.

Dr. Nachtigal's reception by Sultan Ali, and his high opinions of his personal qualities, formed after a stay of several months in Wadâi, are well known. But, nevertheless, the four chapters devoted to his stay at Abesche, his close intercourse with Sultan Ali, and the two excursions, to Wara in the north and to Runga in the south, are full of interest, as they give an insight into the life of a State where Dr. Vogel was murdered, and Moritz von Beurmann was killed by a fanatic official.

The whole of the information gathered by Dr. Nachtigal as regards the territory of Wadâi and its inhabitants is summed up in a separate chapter. The territory of Wadâi proper covers an area of 64,000 square miles, but the authority of its ruler having been extended over the desert tribes of Dâza, Wanya, and Bidjâr, those around Lake Fitri, and those of Kânem and the Bahâr-el-Ghazâl, as well as over Runga and Dâr-Bauda, the whole may represent an aggregate area of more than 100,000 square miles, with a population estimated at 2,500,000 inhabitants. The territory, which has altitudes of from 800 to 1000 feet in the west, slowly rises in the east, and reaches from 1600 to 2100 feet over the sea. In the north it is hilly, and the unfertile soil suffers there from a want of water, while the central part is undulated, well watered, and has a light sandy soil; in the south it is covered with a rich clay. The Batha and Butôba rivers, both flowing from the north-east, are dry during

* Dr. Nachtigal's orthography is maintained in this notice. It must be borne in mind that it is German. Thus, the sound of the English *j* is rendered by the letters *sch*; the sounds *ya* or *ye* by the German *ja*, *je*; *kh* by *ch*; and *sh* by *sch*.

the greatest part of the year, but even then water is found in their beds at a reasonable depth, while during the rainy period they become mighty streams. The Bahār-el-Salmāt in the south is still better provided with water. The supposed courses of the Bahār-el-Ardhe and other tributaries of the Schāri are shown on the map.

Runga is divided into four districts, each of which has about fifteen villages, while Dār-Kūti, in the south-west of it, has but fourteen villages, all inhabited by pagans. The inhabitants of Runga are a fine race of dark-coloured warriors, renowned as bold elephant and rhinoceros hunters. A clayey desert, which becomes covered with impracticable marshes during the rainy season, separates the territory of Runga from the Salmāt river. On the whole, the flies and mosquitoes are so troublesome in Runga that it is difficult to keep horses, donkeys, or horned cattle. Goats and poultry are, however, numerous, and the inhabitants grow Indian corn, sorghum, and *Penicillaria*. In the west of Runga and Kūti the soil is covered with *rahats* or ponds, while southwards the country becomes hilly. Lions, leopards, hyenas, wild boars, elephants, rhinoceroses, buffaloes, and antelopes are numerous there. The cotton-tree (*Eriodendron anfractuosum*), the butter-tree, the oil and deleb palms (*Elais* and *Borassus flabelliformis*), various date-palms, and the *Parkia biglobosa* are grown; so also the pepper-tree, the tobacco-plant, and various tubercle-plants for food. All the tribes in the south of Kūti are described by the Runga and Kūti people under the general name of Banda or Niam Niam, the latter name being given on account of most of them still being cannibals. Dr. Nachtigal also was informed that they are united by a common language, which was spoken by his informer, and of which he collected interesting specimens.

As to the northern part of Wadāi, its moderately fertile soil, partly suffering from want of water, allows only the cultivation of the cotton-tree and the *Penicillaria*, while the central part of the Wadāi territory, as well as its eastern and north-eastern districts, being well watered by canals drawn from the Batha and the Buttha, are the richest portions of the country. Indian corn and the *Penicillaria* are the chief crops. The *Arachis hypogæa*, the *Fountzeia subterranea*, and the *Dolichos lubia* are cultivated as well; also tobacco, indigo, and sesame. Rice and wheat are grown in the best favoured localities. Cattle, sheep, and camels are kept in great numbers. However, on the whole, Wadāi is less fertile than Dār-fôr, and still less so than Bornu, but it is rich in ostriches in the steppes of the north, and in elephants in the south.

The population is of a mixed origin. The chief part is made up of indigenous free black tribes gathered in Dār-Māba (in the north), and speaking the Māba language. The immigrated negro tribes come next, and finally there is a variety of Musulman Arabs, to which the pagan peoples in the south and the Tealas in the north must be added. A detailed enumeration of these tribes, their respective territories and dialects, is given, and two very interesting chapters are devoted—one to the government, the social life, and the trade of Wadāi, and another to its history.

On January 17th, 1874, Dr. Nachtigal left Abesche, and began his journey to Dār-fôr. Of the three routes leading from Abesche to El-Fāscher—one of them passing north, viâ Tāma, another south, viâ Sūla, and the third going straight eastwards—only the latter is utilised by the larger caravans. That route was followed by the party which Nachtigal joined for his journey.

The chapters devoted to the description of the journey, which seem to be simple transcriptions from his diaries, do not satisfy the geographer's longing for more detailed information. On the contrary, the two next chapters, containing the history of Dār-Fôr, as well as those in which the organisation of the State, its subdivisions, the mutual relations of its constituent parts, its population, and so on are treated, are full of the most interesting information, and ought to be translated in full.

Dār-Fôr is by no means a small territory. It is about the size of Prussia, and its population, which chiefly gathers in the centre, the west, and the south, numbers more than 3,000,000 settled inhabitants, to whom an extra half million of nomads, who inhabit the north-east, east, and south, must be added. The rivers flowing from the Marra Mountains towards the west join together to make

the Wadi Azûm, which soon receives the Wadi Bârê, and flows southwestwards. It receives from the north the wadi formed by the junction of the Asûnga and the Abû Sanat, and takes the name of Bahâr-es-Salâmât in the south of the Dâdscho Land. When at El-Fâscher, Dr. Nachtigal also heard for the first time of a country, Fôr-Tomurkije, where the Wadi Ibra takes its origin; it joins, in its south-eastern course, the Gendi and the Bulbul, which both rise in the southern part of the Marra Mountains, and later on flows towards the Nile under the name of Bahâr-el-Taba, or Bahâr-el-Arab.

It would be impossible to sum up in a few lines the interesting information given about the population of Dâr-Fôr, which consists of a variety of negro and Arab peoples. The chief subdivisions are described by the inhabitants themselves under the following five letters of the Arab alphabet: Dal, Ta, Fa, Sa, and Nun, and these names correspond to the stems of Dâdscho, Tundscher, Fôrâwa, Zoghâwa, and Nawaïbo. The Dâdschos formerly inhabited the Marra Mountains, and now constitute an important part of the population in the south, as well as on the south-west frontier where their villages (about one hundred) depend upon both Dâr-Fôr and Wadâf. Their language differs from that of the Fôr people, and has something in common with the dialects spoken on the White Nile.

The Tundscher, who stand on a somewhat higher degree of civilisation, seem to have immigrated into Dâr-Fôr more than four centuries since. A tradition of common origin keeps together their divisions scattered in Bornu, Wadâf, and Dâr-Fôr. They chiefly inhabit the eastern foot of the Marra Hills, while separate branches of that people are scattered over the whole of the region.

The Fôrâwa form the bulk of the population; they inhabit the Marra Hills, a large portion of Dâr-Uma and Dar-Dima, and constitute nearly one-half of the inhabitants in Fêa, Kerne, and Mâdê. They are divided into many sections, of which Nachtigal knew no less than forty. They are mostly dark-coloured, middle sized, and have mean features. Like other mountaineers they cling to their ancient customs, and though those of them who stay in the cities are fanatical Musulmans, those living in the remoter parts of the territory still cling to paganism.

The Zoghâwa are not, as supposed by Dr. Barth, a branch of the Tubu family, but are akin to the inhabitants of Ennedi, to the Bidjât and the small tribes of Wanjanga. They are chiefly nomads, living on their industry as camel-breedsers. As to the Nawaïbo, they seem to be the first of the Arab immigrants into Dâr-Fôr.

The Fezarra, the Dschuzm, and the Bedriju Arabs, which have better maintained the purity of their race, and the Tordschem and Bent Holba, who display a strong admixture of negro blood, are described next, as well as the various negro peoples.

The next chapter deals with life in El-Fâscher, the customs of the inhabitants and their trade. In the last chapter Dr. Nachtigal briefly describes his journey from El-Fâscher to El-Obeid. The book terminates with his friendly reception at El-Obeid.

The two previously published parts of Dr. Nachtigal's work are so well known that it will suffice to say that the third volume is fully equal to them in value. It not only gives reliable information about regions which are still but little known, but enables the reader to form a vivid idea of the life of these remote African States, and to take a real interest in that life as portrayed by so keen an observer.—[K.]

Sisenando Marques, Agostinho.—*Expedição Portuguesa ao Muata Ianvo: Os climas e as produções das Terras de Malange á Lunda.* (Portuguese expedition to the Muata Ianvo. The climates and productions of the districts from Malange to Lunda.) Lisboa, Imprensa nacional, 1889: 1^o fasc., 128 pp.

Mr. Agostinho Sisenando Marques was second in command and the collecting naturalist of the Portuguese Government expedition of 1884-88, to the lands of Lunda, in the basin of the Kassai and its affluents between the upper course thereof and the Kwango. The book now publishing is part of a series, enumerated on the cover and to form 10 volumes, amongst which

Mr. Henrique de Carvalho, chief of the expedition, has already commenced the issue of a practical method of learning the Lunda language (Lisboa, Imprensa nacional, 1889).

Mr. Sisenando Marques was, from 1872 to 1881, Director of the S. Thomé (island) Meteorological Station. The botanical and zoological collections of his recent journey have been sent to the museums of Lisbon (Escola Polytechnica) and Coimbra (University), and are being studied by Professors Bocage, Julio Henriques, and Count de Ficalho.

The work now before us is divided into four parts:—1st, a description of the places successively visited; 2nd, meteorological facts and the climates; 3rd, ailments observed, and their connection with the climates and foods; 4th, tables of observations and lists of specimens obtained. The published number contains the first section of the first part, with a description of Malange (lat. $9^{\circ} 32' 10''$, long. E. $16^{\circ} 15'$), in the valley of the Kwanza. The Portuguese expedition, on its journey to the Kassai, there met Lieutenant Wissmann, Dr. Wolff, Baron von François, and the brothers Müller. According to Mr. Marques, one of the principal objects of the Wissmann expedition was to turn aside, from the Lubuku district to the Zaire, the trade, principally in indiarubber, which is now carried by Ambaca and Ban-galas people through Malange, Pungo Andongo, and Dondo.

The vicinity of Malange is covered with forests, and their principal plants are enumerated by Marques with great minuteness, and the useful products of each are stated: timber, rosins, gums, tannins, medicinal and oleaginous substances, edible fruits, &c. The Malange river spreads itself into large swamps which, being situated beyond the direction of the dominant winds, do not affect the villages very insalubriously.

Mr. Marques mentions the domestic animals of Malange and gives their value in Portuguese money. Oxen are very abundant.

Different travellers are so far in divergence as to the altitude of Malange: Baron von François (Wissmann's expedition) gives it as 3576 feet, Buchner 3543 feet, Wissmann 3871 feet, Capello and Ivens 3363 feet, and Marques 3786 feet, this being the mean average of 150 hypsometrical and barometrical observations. Our traveller describes the farms of many Portuguese and, in one of them, a veritable botanical garden, where notable attempts at acclimatisation are made; the European chestnut, the American caju, the Australian eucalyptus are to be seen there. Wheat is very productive, yielding 5000 per cent., and sometimes even 10,000 per cent. It is sown at the end of February and harvested in the middle of August; wheat roots, remaining in the ground, sprout and bear fruit. The mandioca is the basis of food, sugar-cane is the principal crop of the Portuguese who have distilleries for the manufacture of spirit. Some of the farms are remarkable (as "Inveja" belonging to Custodio Machado, "Esperança," managed by Mr. Passalacqua). There are some good roads.

Lists are given of the products of local industries, of iron, leather, clay, wood, fibre, &c. The up-country chiefs hold old red uniforms of the British army in high esteem. The expedition suffered a great deal from malarian fevers in Malange. Mr. Marques makes mention of the very excellent reception and assistance which the Wissmann Expedition everywhere received from the Portuguese.—[B. R.]

GENERAL.

Annuario dell' Istituto Cartografico Italiano. Anno Terzo e Quarto, 1889. Roma, 1889: 8vo., pp. ix. and 138, map and plate. [Presented by the Italian Cartographical Institute.]

[Cartography].—Exposition Universelle de 1889.—Ministère de la Guerre. Service Géographique de l'Armée. Notice sur les objets exposés. Instruments—Cartes. Paris, Baudoïn & Cie., 1889: 8vo., pp. 63, plates 27. [Presented by the Director of the Geographical Service.]

The geographical service of the French army has only been quite recently instituted, but their exhibit at the Paris Exhibition, to judge from the present

"Notice," shows they are doing good work. The publication contains 27 beautifully engraved specimens of some of the maps exhibited. They form a sort of historical series, with descriptive text, from Roussel's map of the Pyrenees and Burcet's map of Dauphiné, down to the maps of Algeria, Tonkin, and Africa of the present day. The collection is specially valuable for the various styles in which hill-work is shown.

Hamy, [Dr.] E.-T.—*Les Origines de la Cartographie de l'Europe Septentrionale.* Paris, Leroux, 1889: 8vo., pp. 104. [Presented by the Author.]

The learned professor of historical geography in the Sorbonne seeks here to trace the earliest attempt to map the various countries of Northern Europe. Dr. Hamy has entered into great research in connection with his subject, and the results, with his abundant references, must be useful to subsequent inquirers. As is evident, from the part devoted to our own country, Dr. Hamy discusses with great intelligence and much interest the earlier forms of modern names, and such other points as are essential to accurate cartography. Appended are a few specimens of earlier maps.

Mill, Hugh Robert, D.Sc., F.R.S.E.—*An Elementary Class Book of General Geography.* London, Macmillan & Co., 1889: 8vo., pp. xii. and 381. Price 3s. 6d. [Presented by the Publishers.]

Dr. Mill has certainly broken away from the old dry and uninteresting lines on which geographical text-books have as a rule been written. He has written a book which is readable and suggestive, and which contains quite as much information as the average pupil can be expected to digest. The first three chapters deal with geography in general, with physical geography, and the distribution of living creatures. In this introductory portion Dr. Mill states very clearly some general facts and ideas which involve all geographical knowledge. The rest of the book deals with the various divisions and countries of the world. Dr. Mill treats his subject in an attractive descriptive style, avoiding minute details, which will doubtless be filled in by the various other volumes which will go to form the series edited by Dr. A. Geikie. The work contains numerous illustrations, on the whole well selected.

Peragallo, Prospero Lenz.—*Cristoforo Colombo e la sua Famiglia.* Rivista generale degli errori del Sig. E. Harrisse. Lisboa, 1888: 8vo., pp. 336 [Presented by the Author.]

Mr. Harrisse is known as one of the most voluminous writers on Columbus and his period, and the conclusions which he has reached in some points have provoked much controversy. Signor Peragallo is very indignant at some of these conclusions, which, he seems to think, reflect unjustly on the family connections of Columbus, as well as on the character of the great discoverer. With considerable heat and great research he reviews Mr. Harrisse's arguments and conclusions. Whatever may be thought of the author's success, his volume, it must be admitted, contains much curious and minute information on Columbus and his times.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

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Town Plans—10-foot scale:—

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(Stanford, Agent.)

ASIA.

Asia.—General Map of —, constructed from the best authorities, by W. & A. K. Johnston, Edinburgh and London. Scale 1:9,218,880 or 126 geographical miles to an inch. On rollers, varnished.

This is one of W. & A. K. Johnston's series of library maps, in the compilation of which the most recent material appears to have been used. The colouring is not so well chosen as it might have been, for instance, the Spanish possessions in the Philippine Islands are coloured green, and so are the French possessions on the opposite coast; then Manipur has a distinguishing colour, while Kashmir, which stands in the same position with regard to British India, has not; and in this case the colour chosen is yellow, that also being the colour by which the Chinese Empire, in close proximity, is distinguished. With the exception of these defects, the map is a very good one; the hill shading is sufficiently pronounced to indicate clearly the physical features without rendering the map confused, the railways appear to have been carefully brought up to date, and the lettering is well chosen and clear.

Indian Government Surveys:—

Indian Atlases, 4 miles to an inch; Quarter Sheets: 39 N.W. Parts of Districts Ahmednagar, Poona, Thana, and Satara (Bombay Presidency). 47 S.E. District Simla and parts of States Patiala, Jubbah, Suket, Mandi, Bisahir (Punjab), District Dehra Dun and Native State of Garhwal (N.W. Provinces). 49 N.W. Parts of Districts Hissar, Rohtak, Delhi, and Karnal, and of Native States Jind and Loharu (Punjab). 126 S.W. Parts of Districts Noacolly, Tipperah, Dacca, Backergunj (Bengal), and Hill Tipperah (Native State).—Bombay Survey. 1 inch to a mile. Seasons 1884 to 87. Sheet No. 86, Palanpur Agency. No. 87, Parts of Palanpur Agency and Baroda State. No. 119, Parts of the Mahi Kantha

and Palanpur Agencies and Baroda State. No. 215, Parts of the Paunch Mahals and the Rewa Kantha and Central India Agencies.—Oudh Revenue Survey. 1 inch to a mile. Seasons 1864–66. No. 103, Districts Hardoi and Sitapur.—North-eastern Trans-Frontier. 1 inch to 4 miles. Season 1887–88. No. 22, S.W. Part of Singpho Naga Hills.—Upper Burma Survey. 1 inch to 4 miles. Season 1887–88. No. 5 S.E., S.E.T.F. Series, Shan States.—District Chanda, Central Provinces. 1 inch to 4 miles. 2nd edition. Corrections and additions to August 1888.—District Durbhunga, Lower Provinces, Behar (Bengal). Season 1846–49. 1 inch to 4 miles. Additions and corrections to August 1888.—District Ghazipur, N.W. Provinces. 1878–82. 1 inch to 4 miles. 1888.—Jeypore. 8 miles to an inch. 1888.—Index to the Indian Atlas on the scale of 4 miles to an inch; showing the sheets that have been published up to 1st October 1888.—Index to the Charts of the Coast Triangulation. Survey of India. October 1888.—Bombay Forest Survey. Index to the Survey Operations in the Northern Division.—Bengal Survey. Index to the Cadastral Survey in the Maldwar Estate.—Orissa Survey. Index to the Cadastral Survey in the Kujang Estate (Burdwan Raj).—Index to the Geographical Surveys in Upper Burma.—North-Western Trans-Frontier Survey. Index to the Survey Operations in Baluchistan. 1888.

Kleinasien.—Topographische Aufnahmen in Nordwestlichen ——. Im Auftrag der Kgl. Akademie der Wissenschaften in Berlin ausgeführt von März bis November 1886, und gezeichnet von Rittmeister W. von Deist. Scale 1:400,000 or 5.5 geographical miles to an inch. Blatt I. Das Gebiet des Kaikos und Unteren Hermos. Blatt II. Itinerare in Phrygien und Bithynien. Petermann's 'Geographische Mitteilungen,' Ergänzungsheft No. 94. Gotha, Justus Perthes, 1889. (*Dulau.*)

— Skizze des nordwestlichen — zur Übersicht der hauptsächlichsten Reiserouten W. von Deists und der administrativen Einteilung Bithyniens. Scale 1:2,000,000 or 27 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Ergänzungsheft No. 94, Tafel III. Gotha, Justus Perthes, 1889. (*Dulau.*)

AFRICA.

Eastern Africa.—A map of part of —, prepared by authority of the Imperial British East Africa Company, by E. G. Ravenstein, F.R.G.S., &c. Scale 1:500,000 or 6.8 geographical miles to an inch. 9 sheets. London, printed and published for the Imperial British East Africa Company, by George Philip & Son, 1889. Price 12s.

In the compilation of this map the author has made use of all the most recent and reliable material. It is drawn on just twice the scale of his map of Eastern Equatorial Africa, and contains a larger amount of detail. The boundary between the British and German spheres of influence is indicated by a bold red line, the north-eastern boundary being shown by a dotted line until it reaches the Tana river. Three insets are given, one of the region of the Kilima Njaro, another of the Lower Ozi and Tana, and a third of Mombaza; these are drawn on a uniform scale of 1:250,000, which, being exactly double the scale of the principal map, is extremely useful for comparison. Sheet 7 contains an excellent map of the region between Baringo and Emin Pasha's Province, on the scale of 25 statute miles to an inch.

AMERICA.

Brazil.—Die Kolonien im Munizip Santa Cruz (Rio Grande do Sul). Nach den Aufnahmen v. Ingr, C. Trein u. Anderen entw. u. gezeichnet v. Paul Langhans.

Scale 1:320,000 or 4.4 geographical miles to an inch. Petermann's 'Geogr. Mittheilungen,' Jahrgang 1889, Taf. 11. Gotha, Justus Perthes, 1889. (*Dulau.*)

— Die Kolonien am Mittleren Taquary (Rio Grande do Sul). Nach den Aufnahmen v. Ing. C. Trein u. Anderen entw. u. gezeichnet v. Paul Langhans. Scale 1:320,000 or 4.4 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1889, Taf. 12. Gotha, Justus Perthes, 1889. (*Dulau.*)

AUSTRALIA.

Victoria, Australia.—Map of Victoria, constructed and engraved at the Surveyor General's Office, Melbourne. Revised 1888. Scale 1:510,000 or 7 geographical miles to an inch.

— Geodetic Survey of Victoria. Division I. Divisions I and E. Scale 1:126,290 or 1.73 geographical miles to an inch.—Maps of the following districts. Scale 1:126,290 or 1.73 geographical miles to an inch. Benambra, Bendigo, Buln-Buln, Polwarth, Evelyn, Follett, Grant, Gladstone, Grenville, Gunbower, Heytesbury, Hampden, Mornington, Rodney, Lowan, Moira, Villiers, Normanby, Ripon, Tatchem, Talbot, Kara Kara, Tambo, Tanjil, Bourke, Wonnangatta, Boring, Karkaroc, Dargo, Dundas, Dalbousie, Delatite, Anglesey, Bogong. Department of Lands and Surveys, Melbourne.

CHARTS.

Service Hydrographique de la Marine, Paris.—No. 4327, Atlantique Nord, Carte de la Direction et de l'Intensité probables des Courants, par G. Simart, Lieutnt. de Vaisseau. Semestre d'Été (Avril-Mai-Juin-Juillet-Août-Septembre), 1889.—4328, Atlantique Nord, Carte de la Direction et de l'Intensité probables des Courants, par G. Simart, Lieutnt. de Vaisseau. Semestre d'Hiver (Octobre-Novembre-Décembre-Janvier-Février-Mars).—4341, Golfe du Tonkin, Chenal Intérieur du Port de Kam-Fa à la Pointe Pagode, 1888.—4312, Golfe du Tonkin. De Hon-Matt à Hon-Tseu, 1888.—4309, Golfe du Tonkin, De Tsieng-Mui-Tao au Cap Pak-Long, 1888.—4318, Golfe du Tonkin, Estuaires entre le Day et le Kua-Hoi, 1888.—4323, Golfe du Tonkin, Rades et Chenaux de Tien-Yen, 1889.—4330, Golfe du Tonkin, Mouillage de Bien-Shon, Groupe des Iles Hon-Mè, 1889.—4331, Golfe du Tonkin, Entrée et Cours du Kua-Hoi, 1889.—4311, Golfe du Tonkin, Embouchure du Lakh-Kiao, 1888.—4324, Golfe du Tonkin, Entrée du Kua-Shott ou Rivière de Ha-Tinh, 1888.—4263, Côte Occidentale d'Afrique de Sierra Leone au Cap Lopez, Golfe de Guinée, 1888.—4262, Canal de Suez, 1888.—4314, Méditerranée, Côtes de Tunisie, De Bone à Tunis, 1888.—4244, Tunisie, Du Bordj Djilidj à Sidi Garus, Partie Nord de l'île de Djerba, 1888.—4250, Tunisie, Du Cap Farina au Cap Carthage (Delta de la Medjerda, 1887.—4225, Tunisie, De Kurba à la Sebkhah Djiriba (Golfe d'Ham-mamet), 1887.—4221, Tunisie, De Kelibia à Ras Mahmur, 1887.—4248, Tunisie, Humt-Suk (Côte Nord de l'île de Djerba), 1888.—4241, Tunisie, Gabès, Ancienne Tacape, 1888.—4332, Tunisie, Côte Nord, Iles et Récifs de Cani, 1889.—4326, Golfe du Mexique, Port de la Vera Cruz, 1888.—4317, Océan Pacifique, Iles Loyalty: Ile Mare, 1888.—4349, Océan Pacifique Sud, Archipel de la Société, 1889. Service Hydrographique de la Marine, Paris.

Berghaus' Physikalischer Atlas.—(Begründet 1836 von Heinrich Berghaus), 75 Karten in Sieben Abteilungen, enthaltend mehrere Hundert Darstellungen über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und unter Mitwir-

kung von Dr. Oscar Drude, Dr. Georg Gerland, Dr. Julius Hann, Dr. G. Hartlaub, Dr. W. Marshall, Dr. Georg Neumayer, Dr. Karl v. Zittel, herausgegeben von Prof. Dr. Hermann Berghaus. Neunzehnte Lieferung. Inhalt: Nr. 11, Asien, geologisch. Nr. 39, Isogonen. Nr. 75, Europa um 100 n. Chr. Geb. Gotha, Justus Perthes, 1889. Price 3s. (*Dulau.*)

Sheet 11 is a geological map of Asia and Europe, on which five insets are given on an enlarged scale. These include the salt region of the Upper Indus, the lava-stream of Asama-Yama, the Kuril Islands, Java, the Korea, and Japan. The principal part of sheet No. 39 is occupied by a map of the World on which lines of equal magnetic declination for 1885 are laid down; in addition to which it contains three maps showing respectively the secular changes in the magnetic declination for the epoch 1870-1890; the lines of equal magnetic declination in the Polar Regions in 1885; and the daily variation. Sheet No. 75 contains five very interesting maps, showing the distribution of races at 100-150 A.D.

Hachette et Cie.—Atlas de Géographie Moderne, édité par Hachette et Cie. Ouvrage contenant 64 Cartes en couleur, accompagnées d'une Texte Géographique, Statistique et Ethnographique et d'un grand nombre de Cartes de Détail, Figures, Diagrammes, etc., par F. Schrader, F. Prudent, et E. Anthoine. Paris, Librairie Hachette et Cie., 1889, 2^e Livraison. Price of each part, containing three maps, 10d. (*Dulau.*)

This, the second issue of M. Schrader's atlas, contains four good maps and six pages of well-written explanatory letterpress, with numerous plans and statistical diagrams. Each of the twenty-one issues which will complete this atlas are to contain three double-page maps, and six pages of explanatory letterpress, the last issue being an exception, as it will contain four maps and an alphabetical index of the names of all places mentioned. The price of each issue is 1 franc, and for the complete atlas, in sheets, 20 francs, bound 25 francs. As the maps of this series already published are good, and the letterpress well illustrated in the manner indicated, this, when complete, will probably be the cheapest atlas of its class ever published.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von —. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Vierzehnte (14) Lieferung. Inhalt: Nr. 46, Ost-Europa, Nr. 3: Süd-Schweden, die Russischen Ostsee-Provinzen, Polen und West-Russland, von A. Petermann. Nr. 68, Afrika in 6 Blättern, Blatt 3, von Dr. R. Lüddecke. Nr. 83, Vereinigte Staaten von Amerika in 6 Blättern, Bl. 1, von A. Petermann. Price 1s. 6d. each part. (*Dulau.*)

Sheet No. 46 is the third sheet of a map of Eastern Europe; it is very clearly drawn, and shows all means of communication by railroad. Sheet No. 68 contains the western portion of Africa from Njeil, Trarsa, in the north to the river Cuvo, Angola, in the south. It is sheet three of the general map of Africa, and contains five inset maps. No. 83 is sheet 1 of a large map of the United States, it contains the region west of the 107th meridian, and north of Lat. 38° N. as far as Cape Flattery.





PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Lake Tanganyika.

By EDWARD C. HORE.*

Map, p. 640.

THE general form of the continent of Africa has been very aptly compared to that of an inverted saucer—the idea of central plateau-like elevations sloping on every side down towards the sea. The comparison is understood, of course, to be general rather than exact, but it is a very intelligent aid, and especially in connection with our subject.

A distant vertical bird's-eye view of this central plateau-like elevation would present an aspect, if denuded of its beautifying elements of wood and water, very much like some of the crater scenery of the moon. In these crater-like cavities, at varying elevations, lie the great lakes of Inner Africa, and through the gaps in their irregular surrounding ridges flow the great draining streams of the continent, rushing through narrow channels, bounding in beautiful cascades over steep steps, and again, flowing slowly over elevated flats, well nigh lost in grass and papyrus. But a more horizontal view would reveal the fact that one of these crater-like cavities, notwithstanding the superior height of a few elevated peaks and ridges, and notwithstanding the superior elevation of at least one other of the lakes, shows the ridge of its surrounding barriers so far above the others, and is so central amongst the watersheds, that, for purpose of general description, we may compare it to the cavity in the centre of the inverted saucer and its surrounding annular ridge.

In this central depression the rainfall is retained, while without it descends in accumulating streams down to the sea on every side, for on the outer sides of this mountain barrier and its buttresses are born the Nile, the Congo, the Zambesi, and the Rufigi.

The form as well as the outline of this mountain ring is irregular. There are passes and elevations, there are places where its sharp edge cuts the raindrops and abruptly decides their destiny, whether for the

* Paper read in the Geographical Section of the British Association, Newcastle, September 1889.

ocean or for the central cavity. Such is the ridge in Usni dividing the Nile waters from those of the Malagarasi, and that in Uguha, which separates the waters of the Lualaba from those of Tanganyika; there are places where the top of the wall is flattened down, and the water hangs in swamps and sponges with its destination uncertain, as in the neighbourhood of Rikwa in the east, and probably the head waters of the Kitangule in the north, but still the boundary is known and defined.

Outside this annular enclosure, although step-like expanses and lake cavities exist, the general form down the sloping sides of the saucer is that of vast radiating ridges descending toward the coast on every side, as conjectured long ago by Sir Roderick Murchison, but, from every side, this interior hilly boundary must be mounted to reach the central depression I am describing.

The area contained within this mountainous ring-fence is, in horizontal form, an irregular oval, whose greatest length is nearly 600 miles from the parting of the waters in the north, of the Kitangule and the Lusizi, to the parting in the south, between the Lofu and the Chambezi, and a width of about 300 miles, from the eastern water-drain of the Gombe in Unyamwezi to the eastern sources of the Lualaba in Uguha, and narrowing towards the north and south extremes of the oval. In vertical aspect it is a deep depression, and in the bottom of the hollow and occupying about three-quarters of its longer diameter, lies Lake Tanganyika, from 2000 to 3000 feet below the higher parts of the mountain ring, and lying more or less close along the western side of the depression.

A section of this great central depression, taken across its minor diameter (a line indeed which is part of an ancient commercial route), almost exactly resembles the details of a fortification. Approaching from the east the "rampart" is ascended in steps—the "crest" of the parapet is crossed as the country of Unyamwezi is entered—a long gently sloping "parapet" and an equally long and steeper "escarp," together about 200 miles, bring us to the "ditch," occupied by the lake, from the opposite side of which a steep "counterscarp" of 2000 feet ascends to the "glacis" forming the western boundary of the depression, from which, at no great distance, the waters descend towards the Atlantic.

This great central depression, shut off on all sides by its containing ramparts, has ever been the source of what of mystery and fable has been connected with African geography. Its form in large measure agrees with the old conjecture of the Mombasa missionaries, gathered from native reports, of "a general sinking of the land commencing about three degrees from the Indian Ocean till the general depression sinks into the bed of a huge lake," and the Kinyamwezi source of the information would naturally give the depression the largest extent, for that

route enters and crosses it at its widest part, while it is also small enough to justify the criticism on that conjecture, that "the fall, if such exist, must be of circumscribed limits."

From three sides, at least, the boundary wall of this depression has been viewed or reported by ancient travellers as the "Mountains of the Moon" and the source of the great rivers, while, if we could imagine the gradients of its ramparts to be carried upwards to a culminating height, the reported snow-clad character of those mountains would be realised, and the four fountains of Herodotus also, which Livingstone hoped to see. It is not impossible. If we leave out, what I have included as part of the area of the central depression, the hilly table-land of Unyamwezi, for I have strictly followed the actual watershed, if we regard that country as the parapet only of the rampart, the shape of the depression is strictly long, narrow, and trough-like, a chasm in fact, with Tanganyika in its bottom, with all the appearance of a violently produced opening in the earth's crust, its sides more closely resembling the walls of a cañon than the undulation of mountain and valley. The Lake itself is not a basin, but the bottom of the chasm, 400 statute miles in length, an average width of about 20 miles, and a depth, along its centre, of 500 to 1000 feet. Not only the appearance of the depression and the Lake lead one to think of volcanic action and earthquake movement: still more practical and impressive evidence has been forced upon me, during ten years of residence there, in the frequent recurrence of shocks of earthquake, sometimes so severe as to open cracks in the ground, as well as the presence of several hot springs, and jets of steam and petroleum, while still more frequent, gloomy rumblings beneath the surface (the complaints and warnings of the storm-demon "Kabogo") indicate that the fires below are still active.

For several years the direction of movement of these earthquakes was recognised as being about N.N.W. or N. by W. In August 1880, a shock of unusual violence opened a narrow crack in the earth for a distance of several miles with corresponding cracks in the walls of houses at Ujiji and, in October 1887, a series of shocks, lasting over twenty days, felt at Kavala Island in the Lake, and reported also at Ujiji, appeared distinctly to be right under foot without horizontal wave-movement. To Sir Richard Burton, the first European traveller to visit Tanganyika, its containing cavity "suggested the idea of a volcano of depression" and Mr. Cooley rightly described it as lying parallel to "the line of volcanic action drawn through the Isle of Bourbon, the north of Madagascar, and the Comoro Islands." Still more interesting would be a scientific study of a line of volcanic action of far greater extent, for I think it will be found that the containing chasm of Tanganyika lies lengthwise along a great circle drawn through the magnetic poles, on either side of which cluster the chief volcanoes, and sites of volcanic and earthquake phenomena, of the eastern hemisphere:

and, in the western, the Sandwich Islands and New Zealand. In connection also with the suggestion of volcanic origin for the Tanganyika chasm, is the remarkable evidence of the peculiar distribution of the natives of that region, noticed further on.

The native name "Tanganyika," meaning "the mixture," or the "coming together" of the waters, is of the most apt significance, for the water of the Lake is drawn from all sides of the depression, taking toll of the waters which would, otherwise, flow to the Atlantic, the Mediterranean, or the Pacific. But the natives now living on the Lake shores certainly have no knowledge of that, and the name therefore seems to point for derivation to some such natural convulsion, as is hinted at in several native legends, bringing about the mixing of the waters in the cavity then formed.

In this unique position it is no wonder that Tanganyika has been the subject of much enquiry—no wonder that, as the highest watershed was reached from either side, the explorer should regard the Lake and its system as feeding one of the other great drains to the coast, but further examination has proved its isolation, and that, for generations, the Lake has been the reservoir, without other outlet than evaporation, for the whole of the drainage of the central depression. For long years, no doubt, there was pulsation between the rainfall and the evaporating power, and also that throughout a long term there was a gain, inch by inch, of the water upon the evaporation, eventually making the Lake brim-full, for at two points great breaks occur in the mountain ramparts of the depression, viz. near Karema on the east, and in Uguha on the west, and, at the time of the visit of Commander Cameron, the Lake had become brim-full, that is, it had reached the level of these two lowest places in the surrounding barrier. But that the Lake had ever reached that level before, I cannot believe in the face of the existence, all round it, of large forest trees, then partly submerged, which had required ages of growth on the dry land, as well as the submerged sites of villages and cultivation.

The eastern gap presented no facility, in the shape of rapid descent, for the flow of the rising lake water, beyond, perhaps, the filling of an independent depression at Rikwa, which, known successively as "river," "lagoon," and "lake," I believe attained the dimensions entitling it to the latter term at that time. But the western gap was close to a steeper edge of the barrier, and its material being soft, and with no buttress behind, the irresistible force of the rising water, after gently flowing over the top for a time, burst the dam, and is still cutting out this soft channel between two hill-sides forming the Lukuga river. When all the soft material is gone, and a rocky sill remains, it will exactly resemble, and act like, a waste-pipe to a tank.

When the lake was brim-full, and before it had washed the soft material out of the gap, the condition of the Lukuga inlet was probably,

for a short time, alternately an indraught, an outdraught, or at rest, and this would reconcile the somewhat varying reports we have had of it.

When I got to Tanganyika in 1878, the Lukuga channel had already been, to a great extent, excavated, and become not a mere overflow, but a rushing torrent. The lake at that time, as near as I can estimate, was at least four feet lower than when visited by Cameron. During the succeeding ten years, it has gone down 18 feet, and is still flowing, but much more slowly, out through the Lukuga. All round the lake there is now a perpendicular height of about 10 feet between the water's edge and those forest trees which must have taken many years to grow on the dry land; and about half that space between the water and the stumps of similar growths, which have been destroyed by the lake as it rose and remained about them, leaving a space of about four or five feet quite bare, except for grass and creepers, the growth of a season or two. The evidence of old residents places the level of the lake nearly up to these old stumps, at about the time of the visit of Sir Richard Burton. Everything goes to show that there has been but one great rising of the lake. A partial submergence of five or six years has sufficed to destroy large forest trees, the remains of which show every indication that all trace of them would be lost by a submergence of ten or twelve years. During the last four or five years, the annual ebb and flow has been from 12 to 18 inches, but the flow always failing by a few inches, the extent probably of the Lukuga discharge beyond the balance between rain and evaporation.

With the breaking of the Lukuga, and the overflow of the Lake waters, the central depression lost its unique character, and is now, in vertical importance, a twin reservoir with that of the Victoria Nyanza.

To some of us but a little blue patch upon the map of Africa, Lake Tanganyika, to the natives of those regions, is "the great water," and the source of many industries, both directly from what it produces, and indirectly, through the facility for transport and communication it affords to the ten different tribes whose territories are fringed by its 1000 miles of shore.

Owing to the immense evaporation, the opposite shores, even where only 15 miles distant, are visible only in the rainy season—then, sailing down the centre of the lake, one realises its trough-like character, but coasting inshore there is a great variety of scenery; here for 30 miles at a stretch you sail in deep water close alongside the mountains, which rise steeply to over 1000 feet, showing broad patches of rock amongst miles of beautiful trees; again, in a few places, shallow flats only permit access to the shore by poling in canoes. Steep rocky islands with dry soil, set out in the lake so as to be always ventilated, supply sites for residence, and many fine natural harbours give facility for navigation.

We find around the shores all the beauties and the grandeur of the

lake scenery of our own country, on a much larger scale, and in places diversified, while not hidden, by tropical luxuriance.

Pebbly creeks with clear water and pretty shells fringe the drier and more scrubby forest regions of lower elevation, and invite the visits of the buffalo, the zebra, the elephant, and all the larger animals. Muddy river mouths, choked with reeds and papyrus, and swarming with hippopotami and crocodiles, afford a home for ducks, geese, the ibis, kingfishers, the beautiful crested crane, and many other aquatic birds. Again, there are deep quiet inlets with lofty and almost perpendicular sides, ending often in a deep chine with a cascade; the turtle floats in the water below, and the otter glides in and out after its prey with scarcely a splash; the weird cry of the fish-eagle, echoing from side to side, only serves to impress on the visitor the solemn silence of the place, while far above all, on the lofty heights, far overhead, the virgin forest of gigantic trees revels in perpetual moisture, sheltering tree-ferns, and festooned with lianas and rattan, affording a home for brilliant butterflies below, and rare monkeys above.

On those parts of the shore which have become the haunt of man there are two distinct kinds of scene. In the more unsettled regions, where from long and sad experience all strangers are viewed with suspicion, native villages, with houses in close array within stockades, are seen perched upon peninsulas and other easily defended positions, their stores of corn and dried fish stacked upon rocky islets, and their canoes drawn up amongst the rocks close at hand. In happier countries mile after mile of scattered houses, peeping out from amongst groves of bananas, indicate peace and plenty, and wide-stretching fields of corn and cassava are spread over the country. Here and there an open space is preserved for the market, to which the natives of both sexes and all ages may be seen hurrying by land and lake, to barter their various produce—oil, mats, fish, salt, goats, honey, and all kinds of wares; along the beach are lightly drawn up canoes of all sizes, cut out of the solid log, and the little catamaran of the fisherman—the whole array of African scenery, alike in its more arid and its most luxuriant form, its saddest and its most peaceful aspect.

Turning to the lake itself, with its long open stretches of deep blue sea, all sense of confinement is lost upon the watery horizon, rarely broken by the triangular sail of the Arab merchant's dhow, or the long low log canoe of the native adventurer, both of which coast along shore as much as possible, only crossing the lake after careful observation of the weather. The former, when caught in rough weather, are sometimes left entirely to the mercy of the winds and waves, and being excellent sea-boats, are not often lost. The natives, with their generally deep-laden canoes, have a unique method of riding out a storm; the more robust, and if necessary all hands, go overboard, and holding by the canoes with one hand, at once lightly sustain themselves and serve as a

break to their craft, out of which, in case of still greater necessity, they will throw their property in the order of its least value. As a lake, Tanganyika has many aspects. In fine weather there is no more delightful sailing ground, there being but very few reefs and shallows; most beautiful of all, perhaps, is its aspect on a clear night, when, relieved of the sun's glare, the voyager is able to enjoy the scene. The busy and perpetual hum of insects on the shore gauges the distance from the beach as the boat recedes or approaches, and seems, with the flickering will-o'-wisp, marking out the water's edge, to welcome the home-coming voyager, arrived, may be, after long rain and storm, at the desired haven.

Another aspect is given by the south-easter of the dry season, sometimes lasting as a gale for four or five days, only lulling slightly at night, and causing a bad sea, running the whole length of the lake, and against which it is almost impossible for a small craft to beat. At day-break huge masses of clouds, piled up on one of the great mountain capes of the eastern shore, begin literally to drop down over the lake, till, overshadowing all that side, as the wind begins to rise with a low moan and the water is lashed into little waves, showing their crests white under the overshadowing cloud; then in separating masses, and in long perspective procession, the clouds seem to rush off across the lake to the table-like heights of Goma on the opposite side, where, one after the other, these separate masses, retaining a separate and pillow-like form, pile themselves in regular order, like gigantic hammocks on a ship's rail. Meantime the wind has increased till it is blowing a gale, with a fierce driving sea the whole length of the lake. The sky clears, and a great dryness ensues; the long row of cloud-masses on the western shore remain discharging their moisture amongst the luxuriant forests on those heights, while the lake basin is hot and dry. This is the windy weather. There is also a watery aspect, of which I will relate one experience.

Leaving Kavala Island one afternoon, bound to Kigoma in Ujiji, I made an unusually long passage. In the early morning I got a light fair wind, but it had ceased by daylight, and set in again from the north. The heavy clouds on the mountains of the west side commencing to move north, discharged rain very heavily; clouds then collected along the eastern shore, also moving north and gathering ominously. Meantime we, in mid-lake, were still getting north wind coming down between the two cloud-currents, which were moving in the opposite direction. About 8 o'clock the western clouds were in great confusion, and several waterspouts were formed and moved along with the squall. The mass of clouds on the east side at the same time broke up over Ujiji, discharging heavy rain and much thunder and lightning.

To the north, where the lake shores approach each other, the cloud masses on either side drew gradually together, until, colliding with

much electric discharge, they seemed to return together down the middle upon us in mid-lake. The thunder-claps fairly shook the boat, the lightning crossed and recrossed overhead from horizon to horizon, and the rain came down in torrents and cold as ice. The last glimpse of brighter day went out overhead as the cloud-masses joined together, like the closing of a skylight in a vaulted roof. The group of waterspouts off Goma now seemed to rush out to sea in our direction, and one huge pillar came so dangerously near to us that I was able to closely observe its shape and movements. The base consisted of a pegtop-shaped cloud of spray with its big end just touching the surface of the lake; out of its centre arose a vast glass-like cylinder, forming the body of the waterspout, smooth and solid; all around, outside this central solid column, loose masses of broken water or close spray appeared falling down from the cloud in which the upper end was hidden, and the whole was gently swayed by the wind, but without losing its form or varying in diameter. Glad, indeed, we were when a mass of cloud, lower than the rest, swept down upon our dangerous neighbour and broke it up.

All this time I had half of my crew keeping the boat head to sea in the constantly varying squalls from north-west to north-east, while the other half, with myself, were constantly employed in baling-out the rain which threatened to fill the boat. Four or five other waterspouts were seen at the same time in every stage, from the dipping waving cloud-point, gradually approaching the rising vertex of the whirlpool below, to the long waving attenuated column about to disappear. With the density of the rain and clouds it was as dark as twilight, and so cold that we were all literally shivering and shaking. This continued for some three hours, nor did the sun again show himself till five o'clock. A couple of hours of calm succeeded the subsidence of the rain, and then a fresh breeze from the west took us at full speed into Kigoma Bay, where we anchored late in the afternoon.

But perhaps the most dangerous, and certainly the most disagreeable, is the bad weather at the changing of the seasons, in which both wind and water unite in most alarming aspects.

Fierce squalls, suddenly shifting in direction and causing a dangerous cross sea, are accompanied by driving rain and hail, and at night a terrible darkness makes navigation still more difficult. At these times I have seen the natural electric lights, "St. Elmo's fire," for hours together, at each masthead and spar-end.

It will be seen that the seasons are the wet and the dry, following the general arrangement in Tropical Africa, with the greatest meteorological disturbance at the changes. The various observations I have taken were at Ujiji, in S. lat. $4^{\circ} 54' 30''$, from 1878 to 1880, and at Kavala Island, in S. lat. $5^{\circ} 40'$, from November 1885 to June 1888.

Whilst in 1879, 29·78 inches of rain fell at Ujiji, there fell in London, during the same year, 30·13 inches, a difference of not half an

inch. In 1878 nearly an inch more fell in London, and in the only two months recorded at Ujiji, in that year, the rain was also in excess of the corresponding period in 1879. Of the rain of 1880 at Ujiji I have only records up to October, but, adding to that the average of the preceding two years for November and December, we have, for 1880, 27·31 inches, a difference again from the London rainfall of just half an inch. But at Kavala Island, in 1886, 52·07 inches was measured; in 1887, 52·25 inches, and for the earlier part of 1888 an amount which promised for the whole year about 58 inches.

The hottest time of year is in November and February, and the coldest in July. At Ujiji a maximum of 83°, a minimum outside of 58°, the ordinary temperature being 76° to 79°; all but the minimum, inside a house with thick walls and roof. At Kavala, in a much slighter built house, a maximum of 86° and a minimum of 60°.

The position and formation, however, of the Lake, and the depression in which it lies, much lessen the value of a few isolated observations, which can scarcely be taken as representative of the region; perhaps, however, those I have given are as valuable as could be got from any *two* positions, being taken on opposite shores of the lake.

The climate on the whole is by no means unhealthy, far healthier indeed than the coast regions in the same latitude, and the unhappy experiences hitherto of travellers and missionaries have been due rather to the difficult conditions of life and work than to insalubrity of climate. Many of those who have visited the region have been already debilitated by long journeys under conditions of hardship and anxiety. I have no doubt that, as a few civilised surroundings are secured, and the country and conditions of life become better understood, there will be no complaint of the climate.

Although large patches of the country appear to be dry and scrubby, water would be found nearly everywhere by sinking good wells, and only water is needed to fit the land for enormous production of everything that would flourish in a tropical country.

Careful observations of the boiling-point thermometer confirm those of other travellers in placing the height of the lake above the level of the sea at about 2700 feet. The water of the lake is fresh, and during several years' residence I used it for all purposes. The taste resembles that of distilled water rather than that of springs, and some I brought home has been submitted to Dr. Frankland for analysis.

In the nature and condition of its inhabitants the Tanganyika region may be said to be equally central as in its geographical relation, as truly the scene of a mixing as its original position amongst the watersheds.

Around the shores of the lake are ten distinct tribes, truly native so far as century old traditions and customs, locally stamped characteristics of personal marks, and territorial claims, and yet representing distinctly all the different families of Africa, the negro, the negroid, the Zulu, the

Semitico-African, the African branch of the dwarfs, and that inner group of warlike people west of the Nyanzas not yet distinctly classified. All these have converged on, or sent offshoots to, Tanganyika, not as might be supposed, to mix in perpetual conflict, but to range themselves peacefully around the shores of the great lake, where, becoming essentially children of the soil, they yet retain sufficient of their physical characteristics and art to be identified.

The geographical radiation is evident; the ethnological convergence may also be traced. The warlike tribes from the north-west are represented in Usige, where, although to some extent settled as Lakists, they still present the greatest difficulties to the penetration of strangers into their country; but it is the point perhaps at which their opposition is most vulnerable, and, by reason of this, and also of the secure base afforded by the Lake, Usige is the best available starting-point for operations in that direction for connecting with the territories of Emin Pasha.

The Semitico-Africans from the north-east, in a distinct line or belt right away from Abyssinia and the Galla country, developing on the way into nomads, pastorals, or shepherd class amongst other tribes, according to circumstances and surroundings, have on Tanganyika, as the Warundi and northern Wajiji, become naturalised and nationalised. Retaining their cattle, they have also become essentially agricultural, and, notwithstanding such prejudice against "the water" as to consider it unlucky for their principal chief to see it, have acquired maritime habits, being in fact the most expert canoeists and fishermen, and the only users of the catamaran. They retain the splendid physique and superior features of their forefathers, their cattle, the portico to their huts, and, under the favouring circumstances of settlement, have redeveloped the talent for working in iron and copper, weaving, and very extensively the institution of village markets.

A line has been touched by travellers at various points, commencing at the West Coast, of dwarfs and cannibals. This line, or lines, reaches Tanganyika at Ubemba; it is but slightly represented, and, for want perhaps of friendly welcome into the Lake circle, has scarcely been assimilated; but they are undoubtedly small people, with a strong suspicion of cannibalism amongst them, and all are agreed that "there is more of it," i. e. cannibalism and dwarfishness, inland from that point.

The negro type, in irregular but traceable lines, reaches Tanganyika from the west, where it is represented in Marungu, and perhaps Uguha and Goma.

The negroid family extends, in two or more lines or patches, from the East Coast.

The Zulus, as the "Mazitu," have been pressing on towards Tanganyika from the south as far back as we have records, and the Watuta and other offshoots, wearing the distinctive Zulu head-ring, after years

of wandering and occasional short settlement on the south-west edge of Tanganyika, have found a home with the Wanyamwezi.

All these families (except the Zulus) have developed talent for navigation, in exact ratio to certain conditions of the presence of suitable trees for canoe-carving, suitability of coast and harbour, and necessities of exchange. The Warundi and Wajiji alone have become the best sailors under the least favourable circumstances.

But although the lake shore is thus surrounded and occupied by representatives of nearly all the African families, who would seem to have come to the lake from a distance, the greater part of the central depression in which the lake lies, in fact almost the whole of that depression and its rampart not immediately adjacent to the lake, is occupied by the Wanyamwezi, "the people of the Moon country," of ancient origin, and not recognisable as one of the racial rays converging on the region from a distance. Records and local traditions of this people as the original inhabitants are as old as those referring to the Mountains of the Moon, and both from the East and the West coasts, and indicate that the present tribe and its many divisions were once more united and powerful. Yet these Wanyamwezi have never assimilated amongst the Lakists; indeed, the Watongwe, one of their offshoots, occupying over 60 miles of the lake shores, do not navigate, and scarcely utilise the Lake at all. The many colonising parties to distant countries, such as Katanga (now called Garenganza, an ancient name for part of Unyamwezi), have, either in their dread of the lake ferry, or before its existence, gone round about its southern end. None dread the water or are so incapable of canoe management as the Wanyamwezi. The same thing is noticed on the East Coast, where so many of their adventurers, after braving the arduous journey from up country, cannot be prevailed on to cross the strait to Zanzibar.

These conditions and characteristics of this ancient and enterprising people, and the comparatively recent arrival at the lake shore, of the representatives of families from remote points of the continent, would all agree with the suggestion already made as to the origin of the central depression and the lake.

Here then may be studied representatives of nearly all the families of Africa, in a position far removed from that disturbing influence of contact with foreigners to which the natives on the coast are subjected.

The "mixture" has served to promote and encourage native art and industry, and extend the exchange of produce. Improvements in this direction too, introduced by the Arabs in a way not too overwhelming for native acceptance, has served, in some measure, to aid a condition which, whatever the origin of these people, would certainly be one of progression but for the depressing and demoralising curse of the present form of slavery and the slave trade, only still further encouraged by

these Oriental visitors, who in other respects may have benefited the Lake community. Nor can this curse be considered native; the original condition of slavery in Africa was doubtless the natural one which obtained in early ages, in all countries; the present unnatural form (concentrated too upon Africa as the only and last source of supply for other countries) has come from where a more artificial condition of society has developed the worst and the lowest, as well as the highest and best, of the human character.

Certain conditions of society, under which men remain stationary when surrounded with every advantage, may safely be termed retrogressive. I think these natives of Inner Africa, who at least have not lost a condition of moral and social orderliness in which the family tie and the rights of property are regarded, in which physical development also may be considered as well-nigh perfect, and the rudiments, and even the considerable development of all the useful arts and industries have been maintained against overwhelming disadvantages, must, with equal justice, be considered as progressive.

The metals are worked into useful implements and weapons, pottery clay into every form of vessels. All kinds of vegetable fibre are spun, woven into cloth, or plaited into mats and baskets; salt and oil are manufactured, fish is caught, preserved, and distributed; and wherever peace permits, markets for exchange are established. Nothing but security of peace and government, with a gentle introduction of art improvements, is required for rapid progress on every hand.

Of the produce of the lake region, there is to be seen already exploited, cultivated, or wrought by the natives, besides rice and various cereals, the oil-palm, the ground-nut and sesamum, with their oils, tobacco, cotton, and many useful vegetable fibres, indiarubber, dye and fancy woods, besides admirable large timber for local needs. Of minerals, iron and copper, of which beautifully fine wire is drawn, slate, lime, and alum, and splendid clay for pottery of all kinds. An extensive fishing industry already exists, and vast quantities of the animal products, oil, hides, horn, and ivory, are available, both from the lake and its shores. The probability of the existence of still more precious minerals, and of workable petroleum, give promise of yet undeveloped resources of great value.

* ; In view of large commercial undertakings, involving wholesale export of produce, and import of manufactures, there is scarcely a temptation for enterprise. For development of the country for the benefit of its inhabitants, there is ample resource; and the funds otherwise expended in some vast system of transport to effect exchanges, which, in great measure, are unnecessary, would be far better expended in developing, on the spot, the native industries with native material and workers.

Although in a different form (but in a far more wholesome manner),

profit would, in due time, accrue to the promoters and supporters of the improvement.

The lines of communication in Africa, to a great extent following the rivers, and always being towards the centre, necessarily converge towards Tanganyika, to which therefore, there are several means of access: but the elongated form of Africa would give two foci to these radiations, leaving a central space, in great measure crossed by east and west lines, and this is indeed the fact. In Eastern Tropical Africa the lines of communication, both by reason of the geographical features, and of connection and intercourse amongst the tribes, lie for the most part east and west: as though, in a descent from the north, the tribes of compatible characteristics had become shaken together in sediments or strata, hence it is always easier to travel from east to west than from north to south, and the difficulties of various African travellers correspond exactly to their progress in the latter direction. But when by settlement and intercourse the difficulties of language and the non-existence of native routes become of less importance, there are natural features in the great lake system that point to the possibilities for an easy great north and south line of communication from the Nile to the Zambesi. Till that is achieved, the most natural, and indeed, the easiest mode of access to Tanganyika is along one of the natural east and west lines to which I have referred, and which is actually a great natural route right across the continent from Zanzibar, by Tanganyika and the Congo, to the West Coast, a route crossed in the Tanganyika region by such irregular and zigzag north and south communication as has, from time to time, existed by means of European travellers and others. During the early part of the effort to reach Emin Pasha, letters passed through my hands, on Tanganyika, from South Africa for Emin Pasha and from the Congo for Zanzibar. The way of access to Tanganyika at the present, and for the last ten years, is and has been, the overland route from Zanzibar. The difficulties of this route have been much exaggerated, both more than doubling the time necessary for traversing it, and unfairly abusing the Zanzibar porters, who afford the ready and efficient means of conveyance. The most laggard of the Arabs, who stay a month or six weeks at Unyanyembe, do it in five or six months with laden caravans. The usual time taken by the London Missionary Society's annual caravans, laden with goods, is three months. I have walked over the route myself, under those conditions, in ninety days, another time with several Europeans, heavy loads, and a boat on six carts, in 104 days. Without loads, I have walked it in 62 days, and with my wife and child, I accomplished the journey, last year, with the greatest comfort, in 72 days. As compared with the Nyassa route, it is native means and methods perfected and energised by Europeans, as against unperfected European arrangements clogged and hindered by all the difficulties of a new country, a case of utilising and improving

what already exists, rather than introducing wholesale an entirely new system. With the details perfected, and further expenditure in providing means, the European system ought in time to excel, but up to the present the old road has been the only dependable one, and for the due comfort and well-being of passengers, the two routes are not to be compared. On the old road one gets a through carriage in the shape of an organised party accustomed to discipline, and who, together with the tent and other travelling appliances, are the same to the journey's end. On the Nyassa road, the constant changes from a water route to overland, and *vice versa*, and the deadly marsh region, which has to be passed through, are utterly wearying, whilst at the end of the route there is still 200 miles of overland journey through an almost untraversed country, to be commenced from a point which is not a caravan depot. As to expense, the *nominal* cost of transport is in favour of the Nyassa route, but a comparison of actual achievements and delays and losses, leaves a decided balance in favour of the old road. When the central lake route comes into existence, the old road, still further perfected, will form a valuable route by which to tap the Lake region from the east, as well as to afford access to the rich countries it passes through.

Tanganyika was the first of the great Central African lakes visited by Europeans and thus laid open to accurate description. Sir Richard Burton thus opened out the mysteries of Central Africa, and his records and descriptions are yet unsurpassed. Investigation of the other lakes rapidly followed, and from time to time they have been visited by travellers, and, for some years past, become the scene of Christian missionary effort. Tanganyika especially, as lying upon the great trunk route across the continent, has been visited by many African travellers since the time when Livingstone and Stanley met at Ujiji. Not only has it been visited, but, since 1878, there have been Englishmen living on its shores. In that year the first expedition of the London Missionary Society arrived at Ujiji, and, through considerable hardship and isolation, has persistently prosecuted its work. A friendly acquaintance has been made with all the tribes around the Lake shore, and at two stations Christian teaching is now being carried on. As boatmen and builders, general workmen, and servants, many natives have been trained, and a good feeling exists in favour of the English. Even the Arab merchants and settlers have to a great extent lost their first prejudice, and by hospitality and friendly action, and even protection, have aided the objects of the mission.

As well as native-made boats, the London Missionary Society now possess a steel lifeboat and a powerful sailing vessel, 54 feet in length, with auxiliary steam power. The lake shore has been surveyed, the resources of the country and the character of the natives are known, and, together with the Victoria Nyanza, where similar work has been proceeding, is, equally with Nyassa, entitled to such attention and such

claims to English protection and influence as English enterprise and work can give.

The position of the lake with regard to the several European spheres of occupation or influence is peculiar: according to some maps, it is entirely surrounded and shut in, but I am not aware that the Lake itself is claimed by any. Its importance in any future arrangement for opening up Africa and putting an end to the slave trade and the present unnatural condition of slavery can scarcely be overestimated, whether as a rich country of itself (for Tanganyika should include the whole of the depression which drains into it), a centre of commerce and administration, or, simply taking the Lake as the best 400 miles in the great central watery highway of Africa, it is all-important.

For scientific enquiry, for investigation of the native character and languages, the Lake offers peculiar facilities in its central position and relations, besides affording healthy residence for Europeans. Especially is it suitable for an effort to develop the people with the country, by assisting native art and industry in the way I have already suggested. It is to be regretted that the sudden flooding of some regions of Africa with cheap European goods has simply obliterated many valuable native industries, which, under careful encouragement, might have been more profitably preserved. Sad will it be if our operations are to be confined to commercial enterprise simply to enrich ourselves, and the Africans shorn of their native enterprise, and yet not lifted out of native ignorance, drop into subordinate drudgery scarce better than their present condition. The Africans have a splendid country which only requires development. They have ample arts and industries, and only require encouragement and assistance to utilise the resources of their country and become themselves elevated; but the one or the other can only be possible—any enterprise of ours can only be justified—be it political, or commercial, or scientific, if, in its first action and its most stable principle, it aims at the effectual eradication of Africa's curse—the slave trade.

The Bijouga or Bissagos Islands, West Africa.

By EDWARD STALLIBRASS, F.R.G.S.

PERHAPS there is no part of the West Coast of Africa less opened out to trade than that in the neighbourhood of these islands. Situated out of the route of any important steamers, they remain from year to year unvisited except by the Portuguese mail which calls once a month in connection with the mail to the Cape Verde Islands, and by the small French mail gunboat *Dakar*, which runs between the French settlement of Conakri in the Isles do Loé* and St. Louis, the capital of Senegal,

* A corruption of *Ilhas dos Idolos*, Isles of Idols.

calling on the way at Melacoree, Pongas, Cacheo, and other small trading factories, as occasion requires.

The position of the Archipelago may perhaps be best described as being situated in the delta of the Jeba, Rio Grande or Bolola, and the Cassini rivers. It is divided into two parts by the Jeba channel on the north and the Orango channel on the south-east. The western group, which perhaps contains the Bijouga Islands proper, is practically unexplored, and trade is only carried on by native canoes, which occasionally bring poultry and fruit up to Bulama with the object of getting guns and powder in exchange. The natives, although now not actually hostile, have kept very much to themselves, and are as a race very different from those of the mainland and its more adjacent islands. They are men of very fine physique, and possess but few of the characteristics of the West African negro. Captain Beaver, in 'Memoranda relative to West African Settlement, 1792' (York Gate Library), says they resemble the other natives of Africa in nothing but colour. He gives a most interesting account of them, mentioning particularly their warlike propensities and great dexterity in use of bows, spears, and swords.

Of this seaward group the largest islands are Orango, some 20 miles long by 10 miles broad, Kanabak, Formosa, Corbelha, and Carashe.

Formed of decomposed volcanic rock, the soil is exceedingly fertile, and with proper management could be made to grow almost anything. The islands are thickly wooded. High ground of three or four hundred feet is met with, and there are no swamps. Water is said to be rather scarce. As is to be expected in archipelagos of this description, there are innumerable rocks and reefs; in fact, the western or seaward side is bounded by one continuous line of rocks, shoals, and breakers, which render all approach within 20 miles very dangerous. There are also many sandbanks and shoals of alluvial deposit formed by the river Jeba. So far as I am aware, there has been no attempt at colonisation in this group, and indeed it is practically unexplored. A note on the most recent Admiralty chart says, "Some of these islands are inhabited, and the people are generally armed."

Turning to the islands immediately off the mainland, and separated from it only by narrow channels, there are on the north of the Jeba river, Bissao, Bassis, and Jatt, while near the mouth of the Bolola river there are Bissagua, Biafares, Bulama, Bossessami Manteri, and numerous others, nearly all unexplored and many nameless.

The Portuguese were probably the first to visit these islands, and they built a large fort on Bissao. The expense of keeping it up, however, proved too great, and in 1703 it is said to have been abandoned.* The colonists remained however, and what was the fort is now the town of Bissao.

Captain Beaver, an Englishman, acting for the Bulama Society of

* 'Modern Universal History,' published 1781, vol. xiv. p. 241.

London, established a settlement, which he called Port Beaver, in 1792, on the eastern side of the island of Bulama, and on the exact site of what is now the Portuguese town of Bulama, and the seat of Government for the Province of Guiné. This settlement was abandoned in the following year, many of the settlers having fallen victims to the terrible climate, and the whole proving a dismal failure.

Another English colony was soon after established at Bulama Point or West Point, and was destined to meet with great success.

Between the years 1826 and 1846 a very extensive survey of the Bijouga Islands and their neighbourhood was made by various officers of the British Navy, and this is the only one ever attempted.

The English colony at Bulama Point continued to flourish; wharfs were built, and a steamer called regularly from Sierra Leone. An unfortunate dispute arose, however, between the English and Portuguese Governments as to the ownership of the island, and under the arbitration of the United States, Portuguese rights were established. The English evacuated in 1868, and since then the fate of the islands seems to have been sealed. The Portuguese Government, leaving the houses of the English Government officials to fall in ruins, settled at Port Beaver, which, as before mentioned, was renamed Bulama. It is hard to find the reason for this, as Bulama Point is a far better port, is more healthy, considerably cooler, and possesses excellent water.

In recent years the most important event in the history of this district has been the establishment by the West African Telegraph Company of a submarine cable between Bissao and Bulama, and also of a line from Bulama to the main Conakri-Bathurst section, into which it is spliced in the form of a T-joint, thus putting these islands in telegraphic communication with Europe.

My visit in the summer of 1888 had for its object the repair of the Bulama-Bissao cable, which had suddenly broken down.

Having shipped all necessary gear on board the British and African Steamship Company's s.s. *Calabar*, I sailed for Sierra Leone, and on arrival there chartered the small schooner *Salatouk*, 17 tons, from the Senegal Trading Company, and proceeded northwards towards Bulama.

Nothing worthy of note occurred during the voyage, which on account of light winds lasted five days, and perhaps the only thing worth mentioning is that between the Componsee shoals and Alcatraz Island excellent fish are to be caught. My pilot thought it inadvisable to proceed after dark for this reason—as I afterwards found out—and the crew had a good night's sport, red mullet principally being caught.

The advantage of having a sextant with one was brought prominently before me when one evening at dusk we ran into a regular "cul de sac" of breakers, and the pilot came aft with the information that he was lost. We anchored for the night. An attempt was made next morning to get out by the channel by which we had entered, but failed through

light winds. At noon I was able to get a good meridional altitude, and found the latitude to be $10^{\circ} 26' N.$ This and the lead line gave a good position for departure, and with the afternoon breeze we made our way out and set on for Alcatraz Island, sighting it just before dark.

Alcatraz Island, which contains a guano deposit, has recently been brought to public notice by the unfortunate deaths of four men through starvation who were placed there by the Governor of Senegal to mind the French flag, and through mismanagement left to their fate.

Before reaching Bulama I noticed that the buoy on the Areia Branca shoal and both the buoys on the Mao Bank were missing. Subsequently I found that all the buoys marked telegraph buoys on the Admiralty chart were also adrift. The tides in these channels are very strong, and at springs run as much as six knots, so that unless the moorings of buoys are periodically renewed they soon give way, and once adrift the buoy is eagerly seized by natives. One large buoy I heard of as being converted into a storehouse for grain.

On the day after my arrival at Bulama I proceeded to Bissao in a small row-boat through a short cut called the Caroa. This is only navigable at high water, and at low is nothing but a sand-flat, dry by some six feet. On the way I was able to sketch-in some prominent points of Circa Island. Passing the island of Arcas, which is nothing but a mangrove swamp, on our left, we proceeded along the side of a dangerous quicksand—the scene of many wrecks—and entering the Bissao channel, duly arrived at our destination.

Governor O'Connor's description of the town many years ago still holds good; he says:—"Bissao, declining when I visited it last in 1855, has since then greatly deteriorated in trade and appearance. The old buildings, totally neglected, are sinking into ruins; the troops, without barracks, living in miserable mud-huts; the port occupied by only a few colonial and coasting vessels; the market scantily supplied with the commonest necessities of life, are indubitable evidences that the power and prestige of Portugal are rapidly on the wane in this part of the world."

If further proof is needed of the miserable state of affairs, it can be found in the fact that only ten years ago a German trader arrived at Bissao with 300*l.* in English gold in his possession. This gentleman nearly starved, as no one in the place had ever seen English gold, and consequently he was unable to exchange it. Anything more complicated than the currency of Bissao and Bulama would be difficult to imagine. Old Portuguese coins, seen nowhere else, and often defaced, pass current between the two places, while the silver of every nation in the world passes freely, Bolivian only being debarred. All these coins have two rates of exchange, a Government and a mercantile. Trade is comparatively at a standstill. Rubber, beeswax, gum, and ground-nuts, are almost the only exports. The chief imports are cotton goods, tobacco

guns, and powder. Only a few miles up the Juba river Portuguese authority is openly defied, and several small craft have lately been captured and their crews murdered by the Manjack tribe.

After leaving Bissao I had occasion to stay some days at Bulama Point. Being provided with tents, they were pitched on suitable ground, and all made snug for the night. Never in my experience have I passed such a night as that one. Unprovided with mosquito curtains, we were tormented by mosquitos and sandflies of a most venomous kind. Even two monkeys in a cage just near showed their sufferings by continuous howling. After this I preferred sleeping on the bare deck of our schooner, anchored about a mile from shore, and thus comparatively free from these pests.

During my stay at Bulama Point I had many opportunities of wandering about the surrounding country, and enjoyed some good sport with the pigeons which abound there. The country is for the most part cultivated, and grows maize, ground-nuts, beans, mandioca, &c. It is extremely fertile, and with proper management could be made to grow anything. The natives are an industrious set, and they may be seen setting out at sunrise with a long-handled spade, and armed with a spear or sword, for the fields, to return again just before sunset. There are few wild animals, but hyenas and wild cats are occasionally killed. Elephants and buffaloes, which Captain Beaver saw in 1792, have long since died out. Tracks of gazelles are frequently met with. There are a few snakes, chiefly of the larger kinds.

One of the most interesting excursions I made was to the site of the old English colony. The walls of some of the houses are still traceable, and my friend Mr. Silva, the Commandant, was able to tell me who had last lived at every house. Many of the fruit-trees then planted are still living. In the hut of a native I came across another relic of the "time of the English," as it is called, in the shape of an old willow-pattern plate. Many were the regrets I heard at the English having vacated the island, as since then a flourishing village, with a rapidly increasing trade, has dwindled down to a few scattered huts. The huts of the natives are well built of earth or mud, and thatched with long grass. In front of the village are some very fine mango-trees. The fruit just then happened to be ripe, and it was greatly sought after by natives, and at night it was no unusual occurrence to see a dozen women with torches, made of an inflammable grass, waiting to pick up mangoes which the bats living in the trees knocked down or dropped in attempting to carry off.

Cotton-trees are common, and the natives weave a coarse cloth of four inches width in hand looms. Excellent fish are caught in fish-ponds constructed on the rocks of the adjacent beach. There are no sharks here, although they abound both at the towns of Bissao and Bulama, and we enjoyed good bathing.

The town of Bulama is very much superior to Bissao, and boasts of some excellently constructed brick and iron barracks of Belgian manufacture, capable of accommodating 200 men. There has never been any wharf, however, and shipping work is carried on under great disadvantages.* Cattle thrive well, but it is a difficult matter to get good meat, as the right to kill is invested in one individual only, and so there is no competition. Both Bulama and Bissao are convict settlements, and the white inhabitants are by no means pleasant people to have to live among.

As already mentioned, the chief trade with natives is in guns, powder, and tobacco. The guns are the usual "trade guns," with flint locks, painted wood stocks, and gas-pipe barrels. The Bijougas have a curious way of tempering or testing the barrels. The hole at the breech is pegged up with wood, then the barrel is filled with palm oil, and its muzzle also plugged up. The whole is then put into a fire, and if after some time no explosion occurs, the operation is considered successful. Their spears are made of soft iron, or sometimes of copper, and are of excellent workmanship. Poison taken from the black snake is said to be applied to their points. The swords and knives used are of a curious shape, said to be particularly suitable for ripping.

The dress of the male Bijouga consists of a skin round the loins, and a rush skull-cap ornamented with feathers and cowrie shells. The females wear a kilt of grass, and are fond of beads and brass wire ornaments. The bodies of both sexes are freely anointed with palm oil.

The canoes in which long trading expeditions are carried on are most curious. They are made in a single piece from a cotton tree, and sometimes measure as much as 70 feet in length, and are capable of carrying 40 or 50 men, all of whom are armed. Sails are sometimes seen, but short oars are generally used, the rowers squatting on the bottom of the canoe, and rising at the beginning of each stroke. The bow of the canoe is ornamented with a figure-head, generally representing either a cow † or a hippopotamus, while the stern is carved to represent the tail of a rattlesnake. Excellent models of these canoes may be bought, and also carved wooden figures and models of animals. Gourds prettily carved are also seen.

The natives are said to be able to converse by tapping on iron bracelets, but I saw nothing of this. It may have some connection with the drum signalling of the Bight of Benin, of which a full account is given by Mr. Archer P. Crouch, B.A., in 'Glimpses of Feverland.'

The climate of the islands is very unhealthy, and perhaps only

* Just before I left in August 1888 a pier was begun. Piles of a foot in diameter were being driven with an ordinary hand-beetle, and I have not yet heard of its completion.

† Cows' horns are worshipped by the Papels who occupy the coast between Geba and Cacheo.

equalled by that of the Gold Coast. Some of the seaward islands are said, however, to be much more healthy than those nearer the mainland, notably Formosa, a fact readily accounted for by their getting the sea-breeze direct. June, July, and August are the worst months of the year. From the 9th June to 9th July we experienced eight tornadoes, an average of two a week. One of these was a very bad one, and the worst known at Bulama for many years. They were accompanied by deluges of rain and heavy thunder and lightning. Ample warning is given of their approach, and so they are not dangerous.

Before concluding, I should like to take the opportunity of saying a good word for the just now much abused African negro, perhaps generally justly so. The crew of the schooner consisted of four men and a boy, all first rate sailors and good fellows, the boy quite a wag. Besides these, who were all natives of Sierra Leone, I had seven Kruboyas. They were all picked men, of fine physique; one, who was named "Flying Jib," was a perfect demon to work, while another, very properly called "Jack Everyday," was typical of the all-round useful sort. These fellows, throughout a voyage of nearly six weeks, under conditions of some hardship even for a negro, were always cheerful and willing. Nothing could exceed their good humour, a small accident such as a rope carrying away and precipitating three or four of them into the water was to even the victims a source of the greatest amusement. The thorough good-heartedness of these fellows and the nice way in which, on my returning to Sierra Leone after a lapse of some weeks, they all came off on board to see me from motives of pure friendship, are about the pleasantest recollections I have of some pretty hard times.

The Geographical Congress in Paris.

By E. DELMAR MORGAN.

(Concluded from p. 559.)

Thursday, August 8th.

Group I.—Commandant Defforges reviewed the instruments and methods employed in pendulum observations for measuring gravity in the course of a century, expressing the wish that operations of a similar character might be adopted in every country in order to facilitate a comparison of results. The lecturer, who spoke without notes of any kind, by his grasp of the subject and his lucid explanations, greatly interested his audience. In the latter part of his discourse he treated of recent observations made by Colonel Clarke in England and by himself in France, eulogising the former. M. Defforges, who is the author of a pamphlet and of several articles "Sur l'intensité absolue de la pendule," published in the 'Journal de Physique' and the 'Bulletin de la Société Française de Physique,' proposed that a programme of observations should be adopted in order to ascertain the variation of gravity with

altitude, and this was unanimously approved of. M. Grigorief followed with some remarks on pendulum observations in Russia, and M. Wada on those in Japan.

Group II.—Colonel Blanchot treated of erosion and its results, particularly visible in the denudation of summits. He illustrated his remarks by several facts of disafforesting that had come under his notice, and concluded by urging that partial clearances of mountainous tracts by individuals should be checked.

Group III.—M. Metzger's work on emigration was laid on the table. The order of the day was the discussion of the following questions:—The distribution of combustible minerals on the globe. Advantages and disadvantages resulting from the increase of urban populations with reference to the consequent loss sustained by rural districts. New maritime fishing grounds. Disafforesting considered from the economical point of view. After a discussion in which MM. Carrasco, Colonel Blanchot, Guerreiro, and Cravoisier took part, the following resolution was passed:—"The Congress, considering the disafforesting of the surface of the soil to be productive of the most fatal consequences from every point of view—physical, economical, and meteorological, expresses the wish that nations fortunate enough to possess forests should make every effort to preserve them, and that other nations which have lost this valuable possession should take the most urgent and efficacious measures to restore their forests."

Group IV. History.—M. Beauvois resumed the discussion on the voyages of the Zeni. Baron von Schwerin read a paper for M. Dahlgren on the same subject, taking an opposite view to that held by M. Beauvois, and maintaining the Zeni map to be a compilation from earlier cartographical materials. A communication by M. Pector followed on the historians who have written on Nicaragua. M. Pawinski read a curious memoir on the scientific method applied to historical geography as followed by him in the composition of his important work on Poland. M. Gaffarel criticised the division of France into departments, and suggested certain modifications which were, in his opinion, desirable; a discussion took place, opinions being evenly divided.

Group V. Didactic.—A discussion took place on the teaching of geography in primary schools, the inductive method which starts with the study of the commune and afterwards rises to that of the canton being advocated by several members of the group and attacked by M. Dupuy.

Group VI., Voyages and Explorations.—M. Jules Leclerc described the monuments of Samarkand, and especially the mausoleum of Tamerlane.

M. de Sarva Prado spoke of the lines of communication in the Portuguese colonies, with special reference to the routes taken overland as early as the seventeenth century by his countrymen from Portugal to India. M. Francisco Coelho announced that an exhibition will be held in Spain of things relating to Spanish America in 1892, the fourth centenary anniversary of Christopher Columbus. After some remarks by the Vicomte de Cavalcanti and M. Grandidier on the cannibal inhabitants of Brazil the meeting adjourned.

Group VII., Ethnography.—General Venukoff presented an important work on the Kirghiz by General Grodekof, and Dr. Maurel read an interesting communication on the population of Cambodia.

At three o'clock in the afternoon there was a general meeting in the central hall of the Geographical Society, to hear M. Valdemar Schmidt's paper on Nansen's journey across Greenland. Admiration was expressed at this difficult piece of exploration, and it was decided to offer the best wishes of the Congress to Dr. Nansen for the complete success of his next journey.

Dr. Hamy next read a paper by M. Lumholz, delegate of Norway, on the present and future of Queensland, where the author had resided four years. This concluded

the labours of the day. In the evening a reception was given at the Hotel de Ville, brilliantly illuminated for the occasion, in honour of all the congresses assembled in Paris. The Prefect of the Seine and his *confrères* at the mayoralty received their guests in their robes of state. But the numbers present, stated to have been 12,000, and the mixed character of the company, converted the building inside into a Babel of confusion and disorder. Now and again a distinguished citizen like M. Pasteur might be seen for a moment carried along by the crowd, composed chiefly of the lower classes, or an English scientist like Dr. Gladstone resigning himself placidly to his very unscientific surroundings.

Friday, August 9th.

Groups I. and II. united.—H.H. the Prince of Monaco communicated the results of his researches on the North-Atlantic currents. He was followed by M. Caspari, who spoke of our knowledge of marine currents generally, while M. Thoulet described the methods in use for determining the temperature, salinity, and density of the sea. M. Guerreiro expressed the wish that the maritime states of Europe might come to an understanding, in order that experiments should be conducted with similar instruments, and that monthly or quarterly charts should be published, similar to those issued by the United States Government, of the currents bordering their coasts.

Group III. discussed the following subjects:—Industrial and commercial museums; Great overland lines of communication; Sea and trade routes. Colonel Blanchot moved the following:—"That this Congress, taking into consideration the altered conditions of navigation as compared with those existing when the present laws regulating international maritime affairs were established, is of opinion that these rules no longer meet the requirements of the times, and that they should be revised as soon as possible in the interests of humanity. It further desires to record its sincere wishes for the success of the congress shortly about to meet at Washington on this very question."

Colonel Blanchot's proposition was adopted unanimously.

Group IV., History.—M. Hentgen communicated a paper on d'Anville's geography and his special researches on the measures of the ancients. Abbate Pasha reminded the audience of a remarkable study by Mahmoud Bey on the Egyptian stadium, published in the Bulletin of the Khedivial Society of Cairo. M. Eckman read a memoir by M. Caron on Tunis, the Roman mines and their utilisation by the French, both from the practical as well as the scientific side. Abbate Pasha spoke of the numerous traces of vine culture found in Egypt and of the sudden discontinuance of that industry consequent on the arrival of the Mohammedans.

Mr. E. D. Morgan spoke briefly on "The influence of the development of Islamism in Africa on the manners of the natives and their relations with Europeans." Other papers were read by the Comte de Marsy, MM. Gaffarel and Marcel.

Group V. Didactic.

The following resolutions were adopted:—

1. That it is expedient in the first place to combine local geography with the teaching of the relations uniting the phenomena of general geography and afterwards to give practical exercises upon data furnished by the maps of the Staff Corps (ordnance survey).

2. In examinations, questions involving the exercise of memory alone to be discouraged, and minute detail to be avoided. The Minister of Public Instruction might be memorialised on this subject.

3. Instruction in geography in special schools, agricultural, industrial, and commercial, to be based on general geography.

Group VI., Voyages and Explorations.—Conference by M. Cavalcanti on the

Xingu and its inhabitants. The people of this country are savages, and their manners primitive. In short, they preserve the physiognomy and character of the aboriginal races met with in unexplored parts of Brazil.

Group VII., *Ethnography*.—M. de Gattine treated of ethnography by the fine arts, and M. G. Vianna of Portuguese dialects. M. Capus communicated his observations on the Kafirs, their country and their customs. He spoke of the conditions of travel in that region and of its future, of the routes leading thither, and of the interest presented by the exploration of this part of the Hindu Kush. He concluded his paper by some remarks on the Kafir language, and the distribution of ethnic elements in Central Asia.

At the general meeting at 3 p.m. on Friday, M. Borelli gave a most interesting account of his recent journey in the Gallas country, and M. Maurice Déchy communicated his observations on the central chain of the Caucasus. Both these lectures were illustrated by magic-lantern slides, exhibited with the oxyhydrogen light, the hall being darkened for the time.

In the evening the members of the Congress were invited to a grand entertainment at the Ministry of Public Works, where M. and Madame Guyot received a large party. The gardens were lighted with coloured lanterns, the members of the *Comédie Française* performed, while not the least interesting part of the proceedings was the torchlight procession of the student delegates from all countries who had come to take part in the ceremonies attending the inauguration of the new Sorbonne.

Saturday, August 10th.

On Saturday M. Crampel, lately returned from Central Africa, discoursed on his explorations on the Upper Ogowé, in the course of which he gave an amusing account of how he was married to a chief's daughter. The proceedings of the Congress were then wound up by the reading of a report by Count Bizemont, containing the recommendations of each section. In the evening 140 persons sat down to a banquet at the Hotel Continental. M. Dabrée presided and proposed the toast of the sovereigns represented at the Congress, which was responded to by Vicomte Cavalcanti. M. de Brazza toasted the travellers and explorers, alluding in feeling terms to those who were no more, and M. Maunoir gave the foreign delegates and societies, for whom Mr. E. D. Morgan returned thanks.

I had omitted to state that on Wednesday afternoon M. Lessar, the well-known Russian traveller and topographer, read a paper on the ancient channels of the Oxus, to prove the impossibility of uniting the present course of the Amu-daria with the Caspian.

The Exhibition of Travellers' Collections at the Galerie des Arts Libéraux.—A rendezvous with M. Capus at the Pavillon de la Presse, and a talk over mutual acquaintances in Central Asia, were an excellent preparation for the visit he had promised me to the gallery in which his and many other travellers' curios and trophies are exhibited. First among these was a map of the course of the Ogowe by M. Dutreuil de Rhins, from Ambarene to the river Lulu, on a scale of 1:80,000 in seven sheets. Next was M. Capus' own map of his route from Guldja across the Pamir to the Indian frontier. This map, based on 1800 compass bearings, shows Lakes Muz-kul and Rang-kul, the latter at an elevation of 4125 mètres frozen over; the scale is 5 versts per inch, reduced to one-half of the original scale. When engraved it will serve to illustrate the work upon which M. Capus is now engaged, giving the scientific results of his and Bonvalot's journey. Not far from here were the mementos of M. de Hüber's ill-fated mission to Arabia, this traveller having been massacred at Jeddah in 1884. Farther on we came to the itinerary of M. Thouar in Bolivia, whither he went to search for the unfortunate M. Crevaux, assassinated by Tobas in 1882. Chaffanjon's collection of native implements from

the sources of the Orinoco next claimed our attention. The next case at which we stopped contained the model of a troglodyte cave explored by Dr. Hamy when he and M. de la Croix lately made an expedition in southern Tunis. Next to this were de Brazza's collections from the Ogowe, and hard by an interesting group of arms and head ornaments worn by the tribes in French Guiana, brought home by M. Coudreau, whose '*Voyage à travers les Guianes*' was published in 1887. Prince Roland Bonaparte's grotesque mannikins worshipped by the islanders of the Malay Archipelago reminded us of his last work, '*Les derniers voyages des Néerlandais à la Nouvelle Guinée*,' and his physico-agricultural map of the Dutch colony of Surinam showed that this Prince was not a mere dilettante in science. We were next interested in examining the collection of M. Brau de Saint-Pol Lias, who visited Sumatra, Malacca, Java, Tonkin, and Cambodja. Here were the pillows and pipes used by opium smokers, the swallow-nests eaten by the Chinese, and insects closely resembling leaves of plants. A number of ethnological things brought by M. Charles Rabot from the north of Europe, from Norway, Finland, Lapland, and the Peninsula of Kola, attracted our attention, for this traveller first made his name by his translation of Nordenskiöld's voyage of the *Vega*. In another part was an excellent pen and ink drawing of the temple of Edfu in Egypt by M. Rochemonteix, and the fine model of the temple of Sura constructed at the cost of the Ministry of Public Instruction under the direction of M. Dieulafoy. This temple covered, it is said, 9200 square mètres of superficies.

In a separate gallery were shown the apparatus used in deep-sea dredgings by the *Travailleur* and the *Talisman* between 1880-1883 under the direction of M. Milne-Edwards. There were drawings here of fish brought up from great depths with optic nerves scarcely developed, two phosphorescent mirrors on either side of the head serving to light the animal on its darksome way; here too were curious crabs, *Eurypharynx pelecanoidea*, *Homola Cuvieri*, and delicate white sponges. Lastly I admired the rich gold and silver vessels brought home by M. Errington de la Croix from Ceylon and the Malay Peninsula, when he made his politico-economical researches there in 1888. Much more remained to be seen, days and weeks might be pleasantly and profitably spent in examining these collections, but my time was short, and thanking my cicerone once more I passed into another part of the Exhibition.

GEOGRAPHICAL NOTES.

Sir W. MacGregor's Ascent of Mount Owen Stanley.—We are indebted to our colleague, the Rev. W. G. Lawes, of Port Moresby, for the following interesting details regarding Sir W. MacGregor's successful journey to the summit of the Owen Stanley Range in New Guinea. The route taken was via Redscar Bay and the Vanapa river. A camp was formed about 40 miles up this river, and Mr. Cameron sent thence to the Rigo district, 30 miles east of Port Moresby, to engage the chief Kebokanamos (who accompanied Mr. Cuthbertson two years ago to Mount Obree) and a number of Papuans. The party left camp for the range on the 17th May. It was composed of four Europeans and thirty-eight natives, including several South Sea Islanders, good bushmen and travellers. The route was one never attempted by any previous traveller, and led over hill and valley, across rivers, and through scrub, a path being made by knife and axe, until the summit of Mount Musgrave was

reached, about 9100 feet. From this some of the carriers were sent back, others remained with Mr. Cameron, whilst Sir William and a faithful five, Mr. Belford (a Samoan half-caste), a Fijian, and three Papuans, pressed forward. On the 11th of June the latter reached the highest crest of the range, 13,121 feet above the sea. The elevation was named **Mount Victoria**. The weather was damp and foggy up to 8000 feet, but above that height, a clear blue sky prevailed. During the ten days the party was above 10,000 feet not a cloud was seen: the climate was simply magnificent. The sea on both sides of the island was visible; the north side, of course, the most distant, and the stretch of inland country towards it was much more level than that on the southern side; it was, therefore, concluded that the ascent of the range from the north would be unobstructed and easy. From Mount Victoria eastward to Mount Lilley stretches an uneven crest 30 miles in length, and along it Sir William travelled, being altogether three and a half days on the summit. His eyes were here gladdened by the sight of daisies, buttercups, forget-me-nots, and white heath, which grows densely in large patches looking like snow. Large icicles amused his tropical companions, who thought their mouths were burnt when they tried to bite them. Larks were plentiful, similar in wing and song to those of Northern Europe. There are no trees within 1000 feet of the summit. The long-tailed Bird of Paradise, once before obtained by Belford (now in the Sydney Museum), was met with from 5000 to 9000 feet, some half-score specimens being secured. Another, apparently new, Bird of Paradise, was obtained on the top of Mount Knutsford.—The southern slope of the range is drained by the Vanapa river, the head of which was crossed at an elevation of 10,130 feet. No natives live on the mountains above 4000 feet, but they hunt as high up as 9700 feet. Although the Papuans at the base of the hills proved very friendly, nothing would induce them to accompany the party in the ascent. Sir W. Macgregor's botanical collection has been sent to Baron von Müller, of Melbourne, for determination; the zoological and geological collections would be taken by Sir William himself to Brisbane. The party returned to Port Moresby safe and well on the 25th of June. Soon afterwards Sir William left on an official visit to the Louisiade Archipelago. A full report of the expedition will soon be published.

Names and Heights of Summits in the Owen Stanley Range.—The following are some of the principal heights observed by Sir W. Macgregor's party:—

	Feet.		Feet.
Mount Victoria	13,121	Mount Griffith	11,000
" Albert Edward	12,500	" Gillies	8,000
" Scratchley	12,000	" Parkes	8,000
" Knutsford	11,157	" Musgrave	9,100
" Douglas	11,796	" Belford	6,000
" Service	10,000	" Henry Forbes	(?) 8,000
" Mollwraith .. between	and	" Frank Lawes	(?) 8,000
" Morehead	11,000		

German New Guinea.—In the course of a short excursion from Finsch Haven, Dr. Hellwig, the botanist, made in January last an ascent of the "Saddle Mountain" (3182 feet), which is situated about $5\frac{1}{2}$ miles from the coast. The whole mountain is very rugged and densely wooded.—Baron von Schleinitz has prepared on a large scale a map of the coast of Kaiser Wilhelm's Land from Cape Oretin to the Lagoarant Islands, near Hatzfeldt Harbour, embodying the results of recent surveys and observations.

News of Mr. F. S. Arnot.—We have received a letter from Mr. Arnot, giving an account of progress made on his second expedition into West Central Africa. Writing from the Kivula country, Benguella, on the 2nd of July, he says:—The carrier system has almost completely broken down; the discoveries that have recently been made in rubber-yielding roots having drawn off those who all their lives have been porters. When I found that the state of things was such that even the Portuguese traders have been compelled to give up the interior trade for want of hands, and that the priest at Bailundu had forsaken his post owing to the failure of his supplies, I at once telegraphed home for mules. After making repeated use of the new-laid cable to Benguella, I have hopes of getting twelve transport mules by the August steamer. It will be enough if mule transport be carried out as far as Kivula or Bihé; beyond those places carriers are procurable. Meanwhile I, with those with me, am giving a little time to examining the road up through those passes. The path rises more than 4000 feet within a distance of 60 miles, and is exceedingly rugged, but not impossible to animals. We have, indeed, three with us, a horse, a donkey, and a mule, the last surpassing the other two, though the donkey is a large Spanish one, and the horse has been used to rough roads in the Cape Verde Islands, from where I expect to obtain my mules. All is peaceful in the interior, and the people apparently wholly given up to trade.

Death of Lieutenant Tappenbeck.—We have with regret to record the death of this distinguished African traveller, which took place on the 31st July last in the Cameroons, whither he had returned from the interior. According to the last news chronicled by us* he was stopping alone at the newly founded station of Epsumb, situated under $3^{\circ} 48'$ N. lat. and 12° E. long., which he and Captain Kund had established upon their second journey into the country between the Upper Njong and the Sannaga. It appears that, after Captain Kund left him to return to the coast, he made in May a successful excursion to the north-east, crossing the Sannaga, and reaching the territory of the chief N'Giran, whose capital lies under $4^{\circ} 42'$ N. and $12^{\circ} 25'$ E. Here he found commercial relations existing between the natives and the Mahomedan Hausa States, which lead to the slave trade, and all its attendant misery. On

* "Proc. R.G.S.," *ante*, p. 565.

the 10th June Lieut. Tappenbeck returned to the station, and set out a week later for the coast, where he arrived on the 12th July, only to succumb to a sudden attack of fever. His work in the exploration and opening up of the South Congo basin, and his subsequent journeys in the Cameroons district, placed him in the first rank of African explorers, and his death has left a gap which will not easily be filled up.

Mr. F. Monks' Adventurous Journeys in the Interior of South-Eastern Africa.—The Right Rev. G. W. H. Knight Bruce, Bishop of the Orange Free State, &c., has communicated to us some particulars of two remarkable journeys undertaken with very slender means through Bechuanaland and Matabeleland to the Zambesi by Mr. F. Monks (known in the colonies as Mr. F. Foster). The letter is accompanied by a map drawn by Mr. Monks, which gives somewhat minute topographical details, especially the course of the numerous streams, of the country traversed between Gubuluwayo and a point on the Zambesi about 20 miles below the Gwai tributary, as well as of the tributaries of the Zambesi, thence downwards to Tete. He appears to have been actuated by a pure love of exploration. The Bishop states that he started from the Diamond Fields on his first journey with scarcely any money, driving a donkey before him, and on reaching the Zambesi exchanged the animal for a canoe, in which he navigated the river to Quillinnane, making several excursions inland and ascending the Shire. On his second expedition (in 1887) it appears that he intended to reach Lake Bangweolo and establish there a trading station, and the Bishop, who was then himself on a journey overland to Zumbo on the the Zambesi, was in correspondence with him with a view to his joining the Bishop's party and their proceeding to Bangweolo together. The last letter the Bishop received was dated November 10th, 1887, from Tete, shortly after which Monks proceeded up the river, intending to ascend the Loangwa, and was, the Bishop believes, killed by his men.

The Italian Colonies on the Red Sea littoral and Somali Coast.—The following information as to the extension of the Italian Colonial Territory in North-east Africa is of interest. Even before the occupation of Keren and Asmara by the Italian troops, the possessions of Italy had been considerably extended both towards the interior and the north, so that Embesemi, north of Massowah, no longer forms the northern limit, which now extends to Ras Kasar ($18^{\circ} 2' N.$ lat.), while the by no means well-defined southern boundary of Raheita towards Obock forms the limit on the south. In the west and north-west of Massowah, the tribes of Habab, Beni Amer, &c., have recognised the Italian Protectorate, which consequently stretches to the upper course of the Baraka, and to the middle Auseba. The number of inhabitants is calculated at 220,000. An excellent map of the Protectorate on scale 1:800,000, embodying most of the recent acquisitions, has been prepared by Professor P.

Durazzo. On the Somali coast also considerable additions to the Italian possessions have been made. The southern boundary now is constituted by the Zanzibarian district of Warshekh under $2^{\circ} 30'$ N. lat., while northwards the limit extends to Wadi Nogal under $8^{\circ} 3'$ N. lat. It is stated also that the Sultan of Midjertin-Somal, whose territory on the north reaches to Ras Hafun, has entered into an engagement, so far as this northern part of his dominions is concerned, to submit to the protectorate of no other Power but Italy.

Grombehevsky's new Expedition.—This indefatigable explorer * of the Pamir started on the 13th July from Margilan upon a fresh expedition into the territories south of the Hindu Kush, taking a more westerly direction than on previous journeys. According to the latest news he had arrived at Kala-i-Kum on the Upper Oxus, having passed through Karategin and Darwaz. He intended to visit Lake Shiwa in Shignan, and thence to proceed to Kafiristan.

Ascent of a Peak in the Cascade Mountains.—Dr. Julius Röhl, of Darmstadt, in the course of a mission of botanical exploration in the north-west of America, made an ascent in June 1888 of a summit in the Cascade Mountains, hitherto unnamed on our maps. The peak in question is situated under long. $121^{\circ} 15'$ W., and lat. $47^{\circ} 22'$ N., between two small lakes, and about 20 miles north of Easton on the Northern Pacific Railroad. We take the following from a short account of his excursion contributed by Dr. Röhl to the current number of Petermann's 'Mittheilungen.' On the 19th June, in company with Herr Purpus, he made his way through the primeval forest, and over rising ground to the foot of the mountain, pitching his tent at an altitude of 5500 feet. The next morning the actual summit was ascended. It is composed of melaphyr, and many pieces of agate and rock crystal were found. The steep slopes are overgrown with ceanothus bushes, maples, and pines, between which bloom yellowish-red lilies (*Lilium philadelphicum*), and species of dark-red pentstemons. Three successive summits were climbed, the highest was estimated at 7500 feet; unfortunately the exact altitude could not be ascertained, as the traveller's barometer had become useless. The rocky crest of the mountain is covered with the *Selaginella rupestris*, pentstemons, phlox, pedicularis, several saxifrages, and some low umbelliferous plants, &c. Traces of bears, mooses, and mountain sheep were observed. The following day another ascent was made, and a magnificent view of the snow-covered Mount Tacoma obtained. Some weeks later, finding that the peak he had ascended was unnamed, Dr. Röhl designated it "Mount Rigi," from the resemblance to the Swiss mountain of that name.

The Influence of Wind and Rain in Valley Formations.—This question is discussed by Herr Rucktäschel in a short memoir contributed

* Vide 'Proc. R.G.S.,' *an's*, p. 171.

to the current number of Petermann's 'Mitteilungen.' The author, who has been pursuing his studies in Saxony and elsewhere, ascribes the "one-sidedness," which is observable in so many of the river valleys of Saxony, to the action of rainy winds, in the absence of considerations arising from the configuration or composition of the soil. It has been observed that, in the case of most streams in this region flowing through soft sandstone, conglomerate and diluvial soils, the east, north-east, or south-east bank presents a steep slope, while the opposite shore is flat. The cause is, according to Herr Rucktäschel, to be found in the action of the prevailing south-west, west and north-west winds, which, heavily charged with rain, precipitate themselves almost at right angles upon the eastern sloping bank of a stream, washing away the soil in much greater quantity than from the western bank, and thus producing the one-sidedness referred to. Similar phenomena have been observed in some of the river valleys of Prussia and Bavaria. The author lays down the following conditions as necessary for the production of these effects by the westerly rain winds:—(1) the soil must be composed of some loose or soft substance, (2) the valley must be eroded to a certain depth, (3) the volume of water in the stream must not be too great in proportion to that washed down the banks. For these reasons the phenomena can occur, as a rule, only along the smaller rivers; a large river, by the force of its own current, shapes its banks, and the influence of the prevailing rain winds is not so noticeable.

Death of Mr. D. D. Daly.—By recent advices from Borneo we learn with regret that this able explorer died there of fever in June last. Although not a Fellow of our Society, he was well known to many of the frequenters of our meetings from the two admirable papers he read: the first, in May 1882, on his "Surveys and Explorations in the Native States of the Malayan Peninsula, 1875-82"; and the second, in December 1887, on his "Explorations in British North Borneo, 1883-87." He was for many years an officer in the service of the North Borneo Company, having been appointed Private Secretary to Governor Treacher in 1882, and having acted in the years 1884-87 as Assistant-Resident of the Province Dent. On his return from his visit to England in 1888 he was promoted to the Residency of the West Coast of the Company's Territory. Previous to his Malayan services he had filled an important appointment in South Australia as aide-de-camp to his uncle, Sir Dominic Daly, when he was Governor of the Colony. During that time he had charge of one of the survey parties in the Northern Territory. An account of his experiences in the latter region was published in 1887, by his accomplished wife, under the title of 'Digging, Squatting, and Pioneering Life in the Northern Territory of South Australia' (Sampson Low & Co.).

CORRESPONDENCE.

Sub-Office, U.S. Coast and Geodetic Survey,
SAN FRANCISCO, CALIFORNIA,

August 6th, 1889.

DEAR SIR,—I beg to call your attention to the remarks of Mr. H. W. Seton-Karr upon the geographical position of Mount St. Elias, Alaska, on pp. 433, 434, of vol. xi. No. 7, New Monthly Series of the 'Proceedings of the Royal Geographical Society,' July 1889.

As my name has been brought into the matter by Mr. Seton-Karr, I quote a part of his remarks:—

"In 1874 the U.S. Coast Survey observed a series of vertical angles from Yakutat, about 60 miles distant, on Mount St. Elias. Their triangulation fixed the position of the mountain as lat. $60^{\circ} 22' 06''$, and long. $140^{\circ} 54' 00''$ or within six minutes of the boundary. This position was incorporated in Professor Davidson's 'Coast Pilot of Alaska,' he being the head of the Coast and Geodetic Survey. As I believe these were the only observations taken, and as there have been no later ones, it requires to be explained why the position of St. Elias was subsequently shifted. In the next edition of this volume, which is called 'The Pacific Coast Pilot,' and bears the date of 1883, Mount St. Elias is forced to make a fresh jump, and this time clear over the boundary. This new position, for which no reasons are given, is lat. $60^{\circ} 20' 45''$ N., and long. $141^{\circ} 00' 12''$, or just 12 seconds over the line, and—needless to say—on the American side."

This extract contains several misstatements. I remark:—

The title of the 'Coast Pilot of Alaska,' which I wrote in 1867-69, and of which I gave Mr. Seton-Karr a copy, is, 'United States Coast Survey, Benjamin Peirce, Superintendent. Pacific Coast. Coast Pilot of Alaska (first part) from Southern Boundary to Cook's Inlet. By George Davidson, Assistant Coast Survey, 1869. Washington, Government Printing Office, 1869.' This title shows: 1st, that the work was published in 1869; 2nd, that I was not the head of the Coast and Geodetic Survey; 3rd, upon consulting the new edition, you will see that I am not the author of the latter.

An examination of my work of 1869 establishes the fact that on p. 62 I gave the geographical position of the mountain as "lat. $60^{\circ} 22' 6''$, and long. $140^{\circ} 54' "$ "; in the tabulation of geographical positions on p. 206, I repeat the above; and in the column of authorities I note "Vancouver, Tebenkoff's Atlas."

In 1874 Acting-Assistant Dall made a rough reconnaissance of that region, and his report is given in full in the Annual Report of the Superintendent for the year 1875. On p. 182, there is exhibited in detail the "Determination of position of Mount St. Elias" as follows: lat. $60^{\circ} 20' 45''$, long. $141^{\circ} 00' 12''$.

This further shows: 4th, Mr. Seton-Karr erroneously ascribes the data which were published in 1869 to the year 1874; 5th, he does not even quote the data properly, and unqualifiedly asserts that these are the only observations that have been taken and that there are no later ones; 6th, that to prove his case he was obliged to make the ungenerous insinuation that the observations had been tampered with.

There is much that I might say about that expedition and Mr. Seton-Karr's crochet to have Mount St. Elias in British territory; but what I have herein shown is a fair sample of all the rest.

GEORGE DAVIDSON,
*President of the Geographical
Society of the Pacific.*

The Assistant-Secretary R.G.S.

Obituary.

W. W. M'Nair.—We are sorry to have to record the death of this distinguished member of the Indian Survey, who has died at Mussooree of typhoid fever. He had been twenty-two years in the Survey Department, and had done good service, particularly during the Afghan war of 1878-79, when his work lay along the valley of the Kabul river, and during the last two years, in which he has been extending a series of triangles from the British frontier at Dera Ghazi Khan by the direct route across the Suliman Mountains to Quetta and the Khojak Amran. But his most conspicuous piece of work was his journey (in the disguise of a native doctor) into Kafiristan in 1883, an achievement which gained for him the Murchison Grant of the Royal Geographical Society, and which stands quite alone, as unless Russian explorers have recently succeeded in entering the country, there is no record of any other European ever having done so. Major Biddulph had visited Chitral, but Mr. M'Nair not only reached that town by way of the Swat river and Dir, but crossed the mountains to the west, which divide the valley of the Kashkar or Chitral river from that of the Arnawai. He reported that he was kindly received by the villagers of the Lut-dih district, who belong to the Bashgal tribe of Kafirs. The valley is important, for along it there runs a direct and comparatively easy route from Badakshan to Jelalabad. No doubt he would have explored the country more fully, but owing to the conduct of a native, who maliciously spread about the report of his being a British spy, Mr. M'Nair was forced to abandon further attempts. He ascended, however, to the Dora Pass over the Hindu Kush Mountains, which he found to be a little over 14,000 feet in height, with an easy ascent, quite practicable for laden animals. This pass had been previously explored by the "Havildar" on his return journey to India in 1870-71. Mr. M'Nair returned by way of Mastuj, Yasin, Gilgit, and Srinagar. The account of his adventurous and important journey was read by him before the Royal Geographical Society on the 10th December, 1883, but official permission to publish the map could not be obtained.

Sir Edward Strickland, K.C.B.—The cause of geography, especially of geographical exploration and education, in our Australian colonies, has sustained a severe loss by the death of this active promoter of all enterprise in this direction in Australasia, and trusty friend of scientific travellers. He became President of the New South Wales branch of the Geographical Society of Australasia in 1884, the year after its foundation, and continued as the chief director of its affairs until his death, which occurred at Sydney on the 18th of July last. Sir Edward was born at Loughglynn House, Roscommon, in 1821, the third son of Gerard Edward Strickland, of the ancient Westmoreland family of the same name. He was educated at Stonyhurst College, and in 1840 entered the Commissariat branch of the Army Service, subsequently serving in many parts of the world: Canada, Malta, the Ionian Islands, Australia, Tasmania, and New Zealand. He was Senior Commissariat Officer with one of the Army Divisions in the Crimea during the war, and also had charge of this department of the British force in the occupation of Greece from 1855 to 1857. In 1867 he received the honour of C.B. for distinguished services in the New Zealand war, and in 1879 won his K.C.B., and was personally decorated by the Queen at Windsor Castle. He served in the Zulu war, when his successful efforts to overcome the great difficulties of transportation and the supply of provisions to the Army excited general admiration, and in January 1880 he was appointed Commissary General, retiring from the service in 1881. He was twice married, his first wife being the daughter of Mr. F. A. Hely, of Sydney, N.S.W., and his second the daughter of General Tatton B. Grieve, of Orde House, Northumberland. Sir Edward had been a Fellow of our Society since 1860.

PROCEEDINGS OF THE GEOGRAPHICAL SECTION
OF THE BRITISH ASSOCIATION.

NEWCASTLE-UPON-TYNE MEETING, 1889.

THE Geographical Section met in St. James's School, and the meetings were well attended.

The Committee of the Section was constituted as follows:—

PRESIDENT.—Colonel Sir Francis de Winton, K.C.M.G., C.B., D.C.L.

VICE-PRESIDENTS.—General Sir H. E. L. Thuillier, B.A., C.S.I., F.R.S.; R. Spence Watson, LL.D.; J. Batalha-Reis.

SECRETARIES.—J. S. Keltie (*Recorder*); H. J. Mackinder, M.A.; H. N. Sullivan; A. Silva White, F.R.S.E.

COMMITTEE.—J. Theodore Bent; Dr. W. G. Blackie; Sir George Bowen, G.C.M.G.; Sir T. Fowell Buxton, Bart.; Paul B. Du Chaillu; F. W. Dendy; Francis Galton, F.R.S.; Chevalier R. Froehlich; J. G. Gurney; Dr. H. R. Mill; Dr. F. Nansen; Sir Lambert Playfair, K.C.M.G.; Admiral Sir Erasmus Ommanney, C.B., F.R.S.; Dr. John Rae, F.R.S.; E. G. Ravenstein; H. Seebohm, F.L.S.; Eli Sowerbutts; Rev. Canon Tristram, D.D., F.R.S.; Coutts Trotter.

Thursday, September 12th.

The PRESIDENT opened the business of the Section by the following address:—

Geography has not inaptly been defined as "the science of distributions," and from whatever aspect we view it, whether from a large and comprehensive basis embracing all the conditions which surround it as a science, or from the narrower limits of simple physiography, we find certain well-defined principles, or one may term them natural laws, pervading everywhere, whose actions have, through their influences on the past, created the present, and according to the uses we now put them must largely govern the future.

The formation of our globe, unfolded to our vision by scientific discovery, brings us face to face with Nature in all her awful grandeur; and we learn how, under a beneficent and all-wise Providence, this world has been fashioned and made for the use of man during periods of time almost beyond man's calculations; and in the history of man upon earth—a mere drop in this ocean of time—we read of the rise and fall of nations, of great wars, of the discoveries of new routes (so ably described by my friend and talented predecessor in the address delivered by him in Section E. last year), and we see what large and important developments have taken place as regards the commerce and trade of the world by the effect of these influences; and then, turning to more recent days, we enter upon the discovery of steam, and its application as a motive power: a discovery which has given rise to extraordinary changes—changes by which the whole trade of the world and its industries have been stimulated and promoted. Add to this the inventions in electricity, by which almost instantaneous communication has been established with all parts of the globe, and we may well cease to wonder at the increase that has been manifested in what may be termed the motive power of the world, and the development of its larger activities.

Still the natural laws which govern this globe, in their relation to the science of geography, remain the same. It matters not how rapidly you travel from the pole to the equator, you will freeze at the one and perspire at the other; and while

passing through the different zones of temperature lying between these regions—the frigid, temperate, and torrid zones—you will find each with its own products, varying with climate, soil, and peculiarity of position, and these variations pervade the whole realm of nature. Take man as an example: with all his power of brain and reason, he is largely subject to his environment. Look at the toiling millions of the temperate zone, and the enormous activity they display, both mental and physical. Note their colour, form, nervous development; and then pass into the tropics, and the whole creature is changed: he is different in colour, and displays none of the energy or brain-power of the white species of his kind. Why is this? It is chiefly due to the environment in which the creature is living.

The effect of climate upon race is somewhat remarkably illustrated in recent times by noticing the physique and nerve-power of the present race of Americans. The wonderful tide of emigration which has raised them to being a nation of 60,000,000 people may have exercised certain influences as regards this change; but there are many true Americans still in existence. Two hundred years ago they were the same race as ourselves, but the difference between us now is marked. The climate of America has given them an individual stamp, and a perceptible difference in outward semblance has shown itself even in this short space of time.

Similar changes are manifested throughout the whole animal and vegetable kingdom; and while the geologist, zoologist, botanist, and ethnologist deal with separate branches of science, yet each and all have a common ground in geography and its application to the shape and form of land and sea; to the wrinkled folds of the earth's surface which we call mountains and valleys; to the mighty ocean with its currents of air and water, and the influences they exert; to the huge inland seas and lakes; to the great rivers and small streams; to the endless varieties in the animal and vegetable kingdoms; and we find these great elements of nature contributing each in its own sphere to questions relating to the commerce of the world and the development of new countries.

In this brief introduction to my paper I have designedly, though very briefly, drawn your attention to the science of applied geography before passing in review the most recent explorations and discoveries of the present day; and while doing this, I shall endeavour to draw attention to the great necessity for a more thorough study of this science, and the influences it exerts upon trade and commerce, as we gain a better knowledge of the products of one country and the industries of another, as well as the importance of such knowledge to the great manufacturing centres of this nation as new countries are discovered and developed.

It must be remembered we no longer enjoy a monopoly of trade. Other nations are exhibiting large commercial activities; and if we desire a continuance of the trade of Great Britain we must put our shoulders to the wheel with the same energies and creative power that have produced such astonishing results during the present century.

In the Address to which I have already alluded it was clearly shown how largely the rise and fall of the great emporiums of commerce in past centuries were influenced by the struggle for the Eastern trade. This struggle is still going on. The Russians in Central Asia are steadily advancing as each year goes by, and developing that system of absorption which has characterised their policy, especially in that region. . . . The principal work accomplished by their most recent explorers, M. Grombevski, M. Lidsky, and M. Grum-Grijmailo, in Central Asia have been in the region of the Pamir, and from thence across the Hindu Kush into Hunza. Also in Eastern Bokhara and in the upper waters of the Yarkand River, the Kalik Pass, and Kanjut. In the prosecution of these researches, which are all danger-

ously near our Indian Frontier, very full reports are made, more especially as regards trade and commerce; and there is no doubt, since the completion of the Transcaspian Railway to Samarcand, a great impetus has been given to Russian trade in Central Asia, even extending, by well-known routes, as far as the north-west provinces of China, where Russian goods are now found entering into competition with those of English manufacture.

By means of this railway, right into the heart of Asia, Russia has obtained the trade of a vast area, which formerly passed entirely through British hands. Both politically and commercially she is our rival in the East, and the question which nation is to be supreme must come sooner or later.

There is no more interesting country in the world than China. Her teeming and industrial population, her large mercantile centres, the geographical situation of her territory, her undeveloped mineral wealth, her individuality, and the magnitude of her trade with this country, all combine to invest her with a peculiar importance as regards our mercantile community. Coal has been discovered in all the seventeen provinces of the Chinese Empire, but the passive resistance offered by her rulers and her peoples to all attempts by foreign nations to obtain a footing in the interior has prevented any development of her resources. The day, however, cannot be far distant when railways, some of which are already projected, will open up the interior of China and make her better known; but we should be unworthy children of our forefathers if we permit the trade of this rich and widely-peopled country to pass from our hands, either from a want of energy, or from a departure from those principles of trade and commerce whose foundations are built upon the rocks of integrity and honest dealing. Nothing marks the individuality of the Chinese more than that, wherever you meet him, whatever his surroundings may be, he is John Chinaman still; he never adopts the dress, manners, or customs of other nations, but he remains constant to the pigtail, the quaint dress, and the umbrella; and if established in communities, you will find him with his joss-house, food, theatre, and his refreshment-places just as if he were in China.

Our knowledge of the latest acquisition in the East, Burmah, has been largely increased during the past eighteen months. Important surveys in North-western Burmah by Colonel Woodthorpe, R.E., and Mr. Ogle have opened up an area of about 1500 square miles; and the fact of practicable routes between Assam and Burmah via the Patkoi Pass is now established. Burmah, with its large and intelligent population (numbering about 4,000,000), with its valuable minerals and precious stones, with its tropical products, is well worthy of the attention of the merchant adventurer; and as our knowledge of the physiography of the country is rapidly increasing, a study of its applied geography is strongly recommended to the student. . . .

These Central Asian problems are full of deep significance to those desirous of developing and retaining the supremacy of the trade of this Empire in those regions; and I am happy to state that papers full of interest on these subjects will be presented to you during this meeting.

Turning to the northern parts of Asia, I feel some diffidence in speaking before a Newcastle audience on the subject of Siberia, for through your own townsmen, Mr. Sullivan and Captain Wiggins, you are well acquainted with these regions. The exertions made by Captain Wiggins and those connected with him in this enterprise should receive the highest commendation; and that they have been so far successful is a matter for rejoicing. I cannot but think that Russia would not object to the employment of British capital in opening up trade in her outlying dominions; for that trade, once fairly established on good business lines, would be absorbed on behalf of her own manufactures. I do not attach any blame to Russia

in this matter, but I am of opinion that more profits are to be gained when trade follows the flag, for then British enterprise and money reap more certain reward. . . .

From the consideration of Siberia and the Northern Seas it is not a far step to Greenland, whose icy regions and eternal snows have been crossed for the first time in our history. The hero of this exploit, Dr. Fridtjof Nansen, is a native of Norway, and the exploration which he has so recently conducted to a successful issue was rightly alluded to by the President of the Royal Geographical Society, in his annual address, as the most conspicuous achievement of the year.

Though young in years Dr. Nansen proved himself to be a leader of men, and the account of his adventures will be found to be full of interest. The results of his expedition deal rather with the world of science than with commerce, as his discovery proved Greenland to be nothing more or less than a continent whose interior is a huge region of ice and snow. It, however, presents a most interesting study to those desirous of advancing our knowledge of glaciers and the glacial period. Dr. Nansen's description of this immense mass of frozen snow, forcing its way coastwards from the higher plateaus of the interior, by sheer weight and pressure; grinding, crushing, resistless in its slow, but ever-moving power, gives one a faint idea of how the hills and valleys of the more temperate regions of the world were formed when, in remote periods of time, they too were under glacial influences.

Crossing from Greenland to North America, we still find ourselves in regions where ice and snow hold undisputed sway for a considerable portion of the year. The Canadian Government, with commendable activity, keep pushing forward their surveys into what is known as the Old Hudson Bay Territory. The Mackenzie River was found to be a far larger body of water than formerly supposed. More accurate surveys as regards the size of some of the great lakes of those regions are being made, and our knowledge of the climate and the isothermal variations of British North America is each year increasing. Petroleum has been discovered, and, as the geological surveys advance, other discoveries of an important nature may reasonably be anticipated. I have been told of the existence of a huge bed of porous sandstone, saturated with mineral oil, which burns like coal.

Moving southwards, we pass through the prairie-lands of the North-West of Canada, traversed by the Canadian Pacific Railway. These rich lands are rapidly developed, and should form a happy home for some of our surplus population. Colonisation is a subject full of geographical considerations, but it demands a special paper, and I have neither space nor time to introduce it into this address. At the western edge of these prairie-lands are the Rocky Mountains, in whose foothills are now being reared large herds of cattle and horses, as well as flocks of sheep. Some cattle from these fertile regions were shipped last year to the English market, and no doubt a regular trade will soon follow this experiment.

Crossing the Rockies in a westward direction, you come to the Selkirk Range, then to the Columbia or Gold Mountains, and lastly to the Cascades, whose wooded rocky sides plunge into the Pacific. Constant explorations are being carried on through these mountain ranges, chiefly in researches after gold and other precious metals, and our knowledge of their physiography is rapidly increasing. The Rev. Mr. Spotswood Green, in an interesting paper concerning these regions, tells us something of the configuration of the Selkirk Range, which offers alike to the mineralogist, sportsman, and Alpine explorer a field of great interest.

Continuing southward, we pass through the fertile plains and valleys of California, whose large industries in grape and orange culture are being fostered and developed. And from California you enter into Mexico, whose wonderful mineral

resources are receiving a new impetus by the construction of railways, 4700 miles of which are now open to traffic. These railways will not only facilitate the transport of the wealth of Mexico from the coast to the sea, but they tend also to promote law and order among its restless and lawless population. As law and good government are established, so will trade and commerce and the natural riches of the country be promoted and encouraged.

Crossing over to South America, we find considerable progress in commercial activity, chiefly due to the increased means of communication.

In the smaller republics upwards of 1500 miles of railway have been recently constructed; while in the larger states, Brazil has 6000 miles; Peru, 3000 miles; Chili, 1630; and the Argentine Republic, 4700: making a grand total in South America of nearly 17,000 miles of railways. This allusion to railways may not be considered as bearing on the science of geography; but railways are very important factors as regards the commerce and trade of the world, and by the facilities they afford they largely increase the power of exploration. The southern portion of South America has been described by those who have visited and explored its savannahs and prairie-lands as possessing one of the richest grazing-lands of the world, and its development is only a question of time. In its present condition it offers a very interesting field of research to the explorer.

Time does not permit us to dwell long on the islands of the Pacific. Recent events concerning Samoa are fresh in your memories; and while some of these islands have developed commercially, it is when they lie in the great ocean tracks of the world that their real importance is manifested. Take for example the island of St. Vincent, of the Cape Verde group. It is nothing but a barren rock, without any produce whatever; even its drinking water has to be brought from a neighbouring island; yet it pays a large revenue to the Portuguese Government simply from coal dues; for it has a good harbour and lies directly in the line between Great Britain and the principal ports of South America; it has therefore become a most important coaling-station.

From the isles of the Pacific it is but a step to Australasia, with its six great colonies of Queensland, Victoria, New South Wales, South Australia, Western Australia, Tasmania, to which may be added New Zealand. Virgin fields, untrodden by the foot of white man, are still awaiting the explorer to yield up their treasures to the science of applied geography; and when the marvellous progress that has been made in a few short years by our Australian Colonies is weighed and considered, and as its vast interior is opened by exploration, and its mineral resources are developed, who could venture to predict the future that lies before it?

There are now nearly 11,000 miles of railway in operation, and many more miles are in course of construction throughout these various colonies—a sure and certain indication of their energy, wealth, material prosperity, and progress. Geographically speaking, some are not without their troubles. Take Queensland for instance. Her territory runs north and south for nearly 1500 miles, and lies both in the temperate and tropic zones. The Governments who during past years have administered her affairs have experienced some difficulties whilst endeavouring to reconcile the conflicting interests which arise out of her geographical position. Laws relating to labour and capital in a temperate zone are not always in conformity with the industries and requirements of a tropical temperature, in which the white man is obliged to employ labour suitable to the climate. Hence we find a numerous section of the inhabitants of the northern part of this colony agitating in favour of separation. Australia has large coal-measures, and abounds in precious metals as yet hardly developed.

Attached to Australia are the great and lesser islands forming the Australasian

archipelago. The most important of these is New Guinea, and quite recently a successful exploration of its highest mountain range has been accomplished by the present administrator, Sir W. Macgregor, who reached an elevation of about 14,000 feet. . . .

Whether we consider Africa in regard to the extraordinary explorations and developments since the commencement of the work of David Livingstone; or from the fact that vast regions of its tropical portion still remain untouched by exploration; or from a contemplation of the teeming millions of its inhabitants, of which the larger portion have never seen a white man; or from the uncompleted work of the late General Gordon, and the re-establishment of a civilised government over the whole of the Nile basin; or from the slavery question, in which our nation has taken the most active and leading part; or from the spectacle of a white man, Emin Pasha, establishing a settled form of government in the heart of the continent, between the two great slave-dealing communities of the Bahr-el-Ghazal and that of the Upper Congo and Lake Tanganyika; or from the expedition sent to convey to him the succour he so much needs, under the leadership of Mr. H. M. Stanley; or from the intense interest recently exhibited by the nations of Europe in portioning out Africa between each other—an interest that has led on the west coast to the establishment of the Congo Free State, and the German protectorate in the Cameroons, France and Portugal adding largely to the possessions they already held, and England contenting herself with strengthening her grip upon the Niger, and on the east coast by the formation of the British and German spheres of influence; or to the colonies which Great Britain possesses in the southern extremity of this great continent; or to the struggle which sooner or later must be fought out between Christianity and Mohammedanism as regards the native races of Central Africa, in which the river Congo will play an important part: I say when we consider all these and the many other problems of this continent, the vast interests they represent, and the varied influences they may yet exert on the future history of this earth, as well as the extraordinary part which Great Britain has been permitted to play in lifting the veil of mystery and doubt which up to our own times enveloped these regions, we are forced to acknowledge that the country in which the civilised world takes the most active and absorbing interest is Africa, and that the Dark Continent still maintains its supremacy.

As regards Africa, two very remarkable journeys have recently been brought to a successful conclusion—that of Count Teleki, an Austrian, on the north, and that of Mr. Arnot in the regions south of the equator.

The former, entering Africa at Mombasa, at the head of a numerous and well-equipped caravan, passed through the Masai country by what is known as Thomson's route, and, pushing northwards, discovered Lake Rudolph, a large inland salt lake, and by following its shores he was enabled to trace with commendable accuracy its shape, size, and position. The existence of a large lake, called Samburu, in the direction of Count Teleki's journey, had for some time been spoken of by the Arabs who traded in that region, but nothing definite was known concerning it. Count Teleki also obtained much valuable information of the region between Mount Kenia and Lake Rudolph, its inhabitants, its rivers, and its products; and the details of his most interesting and successful journey have yet to be published.

Mr. Arnot, on the other hand, started in 1883 from Pietermaritzburg and crossed the continent *viâ* the Upper Zambesi to Benguela, and thence travelled eastward to the Garengenze country. This kingdom of Garengenze is situated to the east of Lake Moero; and Mr. Arnot has recently published a book of his travels, giving very clear and interesting accounts of these people, their manners, and their customs. Of all Livingstone's followers, Mr. Arnot most closely resembles the great leader

in the patient earnestness, the quiet energy, and the scanty resources with which he prosecuted his remarkable journeys. He has quite recently returned to the west coast of Africa with the intention of rejoining his friends at Garengenze.

The events which attended the expedition under Mr. H. M. Stanley to succour and relieve Emin Pasha are so well known to you all that I need not attempt a recapitulation here.

The value of Mr. Stanley's present journey, in which he has displayed such remarkable energy and courage, is generally admitted, and the geographical information already obtained is of the highest interest. The desiccation of the lake Albert Nyanza, and its influences on the rise and fall of the Nile, is not the least remarkable of these questions resulting from his observations. For my own part, I am of opinion that the rise and fall of this lake are mainly caused by the rapid growth of tropical water-plants. During the dry season this vegetation increases enormously, and at the first rains large masses of aquatic growth are loosened by the rising of the waters. These masses, in the form of floating islands, pass downwards on the bosom of the flowing waters, and on reaching a wide and shallow part of the Nile, such as we find at the Bahr-el-Ghazal, they gradually but quickly collect till they form a dam of sufficient density to obstruct the progress of the river; and the water thus arrested finds a temporary lodgment in the lake of Albert Nyanza, causing it to overflow its normal boundaries. At length the vegetable dam can no longer withstand the weight and pressure of the water bearing upon it; a portion gives way; a channel is opened; and the river, hurrying on to the sea, overflows the banks of the Lower Nile and drains the lake to a lower level. This is what happens to the Albert Nyanza, which is nothing more than a huge back-water of the Upper Nile basin, and it accounts for the lake being seen at two different levels by those two distinguished explorers Mr. H. M. Stanley and Sir Samuel Baker, and hence the difference of opinion as to its true extent and size that has arisen between them. We know that this phenomenon takes place on Lake Tanganyika, as Stanley found a marked difference in its level on the two occasions he rested upon its shores. He examined the Lukuga river at its exit from the Tanganyika, whence it flows, to the Congo; and there is no doubt that a vegetable dam, such as I have described, forms at the point of departure of this river from the lake, and prevents its regular flow till the weight and pressure behind it sweeps all away. During the second year that I was on the Congo we had an unusually heavy flood at the time of the first rains. The river rose several feet in one night, and some months afterwards news came from the Upper Congo that the waters of the big lake had broken through, and this no doubt had reference to the Lukuga River and Lake Tanganyika.

Now, as regards the countries through which we have been passing, there are certain points of great interest connected with the science of applied geography, to which I desire to draw your special attention.

The first of these points is the study of the great railway systems of the world, and the application of railways to the development of new countries. Take our Indian possessions for example. What a change has been wrought, not only as regards the commerce of the country but also with reference to the social condition of its inhabitants and their manner and customs! The introduction of Indian wheat, by means of these railways, into the markets of Europe has caused a revolution in the trade of that commodity. We find this especially in America, where it has upset the calculations of those gigantic combinations or rings which sought to obtain a monopoly in the supply of this universal article of food. Thus the construction of railways in the East exercises commanding influences over the markets of the West.

Consider also the traffic in tea and raw materials from China and Japan to America, with its 60,000,000 people, across the North American continent, by means of the great Atlantic and Pacific railways. Now, although railways cannot compete with direct traffic by sea, when the necessity for more rapid conveyance of certain goods arises, we find that a combination of sea and land transport is often adopted in preference to the longer route by the sea alone.

The development of any country, no matter what its geographical position may be, is enormously increased by the construction of railways. Take the Congo Free State as an instance (which is undoubtedly the finest property in Central Africa). So long as the Upper Congo region, with its miles—measured by thousands—of navigable tributaries, was separated from the Lower Congo by the rapids extending from Stanley Pool to Matadi, this magnificent territory was practically closed to trade and commerce. Every piece of goods in the interior had to be carried on men's heads for more than 200 miles, and all ivory and other products were brought to the coast in the same way. Roughly speaking, such transport costs about 40*l.* per ton. The Congo Free State has wisely determined to build a railway, of some 250 miles in length, to cross this cataract region; and the moment it is completed the future of that country is assured. H.M. the King of the Belgians has kindly given permission for a Belgian officer of distinction, Captain Thys, to read a paper at this meeting on this railway, which will afford a more detailed account of this wise and philanthropic undertaking.

I have mentioned railways as the first point of interest because they are creations of our own time, and have therefore a special interest to us; but the most important factor in the early history of the science of applied geography, and to which the establishment of our great colonial empire is mainly due, is the record of the merchant adventurers.

Their voyages and exploits, extending to every part of the globe, began at the end of the fifteenth century, in the reign of Henry VII., when the Cabots (Venetians) sailed from England to Newfoundland, and afterwards to Florida. This expedition and those which followed it were fitted out at the expense of corporations of merchants, with the object of extending the commerce of the country by a search after trade in new and foreign lands. They were placed under the command of some well-known leader, and the results obtained were extraordinary.

In 1553 the merchant adventurers of England commenced their long series of enterprises in the discovery of the north-west and north-east passages to China and India, and between that date and 1616, Sir Hugh Willoughby, Frobisher, Davis, and Baffin all made remarkable voyages, and their discoveries are handed down by the straits and bays which they discovered, and which bear their names.

In 1578 Drake took the first English vessels into the Pacific Ocean. Drake was not only a bold and successful navigator, but he was also a commander of men, in which he showed rare tact and ability.

In 1498 India was first reached via the Cape of Good Hope. It was not, however, till the year 1600 that any progress was made in the East. In that year the East India Company was formed, and it is to the establishment of this Company that we owe our great Indian Empire. The year 1670 saw the formation of the Hudson Bay Company—a company which exists at the present day. And so the record goes on down to our times. Not the least amongst the trading corporations of Great Britain were the merchant adventurers, of this city in which we are now assembled; and they too contributed in no small degree, not only in the past but in the present, to the extension of our geographical knowledge and its application as a science. No doubt the spirit and energy of our Scandinavian forefathers has been fostered and encouraged until it has now found its development in the enter-

prise and prosperity of this great mercantile centre of the north of England. And the old churches of Jarrow and Monkwearmouth bear further testimony to the fact that, as commerce drew together communities which became centres of maritime energy and progress, religion was not forgotten, and the seed of knowledge and truth thus sown in the early history of the past has spread itself throughout the length and breadth of the great colonial empire of Greater Britain.

Following on the discoveries of the sixteenth and seventeenth centuries, and the marvellous results to which they have given birth, the story of our own times, from a geographical point of view, is quite as wonderful. As I remarked at the beginning of this paper, the discovery of steam as a motive power has brought the world into an extraordinary condition of contactiveness, and quite recently several new companies have been formed in the same spirit and on the same lines as those followed by the old merchant adventurers. These later creations are being started under more favourable conditions than their predecessors, for they have all the advantages which modern science and modern appliances can afford. The English Government have wisely encouraged and promoted the formation of these trading corporations. In countries where climate and circumstances of environment are not favourable to colonisation by white men, our colonial system of government progresses somewhat slowly. It has not the elasticity, nor the adaptability, to provide for the many contingencies which must naturally arise when a few white men maintain the position of rulers over large areas peopled by savage and uncivilised races.

In the island of Borneo there is the North Borneo Company trading, governing, and civilising a large portion of territory with marked success. On the west coast of Africa, the Royal Niger Company is developing the great natural resources of that magnificent river, and its tributary the Benue. On the east coast there is the Imperial British East African Company, operating in what is known as the British sphere of influence north of Zanzibar. Though not a twelvemonth has passed since they commenced their work, their initiatory proceedings have been remarkably successful, and there is every prospect of an early and rapid development of the territory committed to their charge. In the south-eastern portion of Central Africa, the African Lakes Company have fairly established themselves; and a new company is now being formed to open up and civilise a further portion of that section of the African continent.

The establishment of these great trading and governing centres is likely to exercise most important influences. They are, as I have before pointed out, from their organisation and objects, better adapted at the outset to compete with and overcome the obstacles which present themselves to established forms of bureaucratic government; at the same time the Government of this country can interfere, in cases of necessity, by the grants that have been made to them of royal charters, under which they carry on their operations.

A wise control and judicious administration combined with the introduction of commerce and civilisation will, at no distant date, open these territories to the markets of the world, to the missionary, and to the scientific explorer. The commercial element of geography also enters very largely into their promotion and prosperity because of the fields they open to our home manufactures. It is important here to observe that, if these territories had passed into the hands of other nationalities, but a very limited quantity of British goods would ever have entered into them, and their value, as a market for the industries of the nation, would have been lost.

The establishment of a Geographical Society in this city is of real importance. Its objects should be the collection of information, and the study of applied geo-

graphy in all its varied branches and aspects. It should aim to furnish complete information concerning the geography of all parts of the globe. In Chambers of Commerce our large trade centres have, no doubt, means of guiding and controlling some of our most important mercantile operations, but they afford no opportunities to the student, they are not a teaching body; and there are instances where considerable risks have been incurred and heavy losses sustained in some of their ventures, simply from a want of knowledge of geographical data.

I should like to see a Geographical Society in every large city of this Empire, conducted on the lines I have briefly suggested, because the study of, and interest in, the commercial geography of this great Empire and the world is too much neglected amongst us. Past prosperity, and a tendency to run in the same groove, narrow our commercial horizon. Slowly but surely other nations, competing with us in many parts of the world, are doing so successfully because of the study they make of commercial geography.

It is for this reason I have in my address dwelt strongly upon the question and study of geography as an applied science, and it is for a greater reason I urge its importance, viz. that we may hand down to our children unimpaired the heritage bequeathed us by our forefathers; a heritage gained by courage, energy, perseverance, and patriotism—qualities which, under God's blessing, have made this nation the head of the commerce of the world.

The following papers were then read:—

Cyprus. By General Sir ROBERT BIDDULPH, G.C.M.G.—Sir Robert Biddulph, for several years Governor of Cyprus, described in detail its geography, its natural resources, its various cultures, its people, and showed what had been done by the British Government for the improvement of the country and the benefit of the people. He also referred to some of the more remarkable antiquities of the island.

The Congo Railway. By Captain THYS.—In November 1885, a syndicate of English capitalists, headed by Sir William Mackinnon, was constituted with a view of obtaining from the Congo State the concession of the railway from the Lower Congo to the Stanley Pool. The time, however, had not yet come for great enterprises on the Congo. Stability was not yet sufficiently secured. The political work was not sufficiently advanced, so that capital, in order to insure its security, was obliged to demand powers which the Congo was unable to grant, so that the negotiations fell through, and the English syndicate was dissolved.

Shortly afterwards the affair was taken in hand, at my suggestion, on a more modest scale by the "*Compagnie du Congo pour le commerce et l'industrie*," constituted with a capital of 1,000,000 francs, which sum was afterwards raised to 1,225,000 francs, with the immediate object of studying in a practical and definitive fashion the possibility of laying the railway. The statutes were drawn up, however, in order to allow the *Compagnie* to become, by simply increasing its capital, the company for laying and working the railway. The "*Compagnie du Congo*" was definitely constituted on the 9th of February, 1887. By the 8th of the following month of May, the first expedition of engineers left for the Congo; on the 10th of June a second group sailed from Antwerp; at the end of July the gangs, assembled at Matadi, were composed of one director of survey, twelve engineers, and one physician. Those who had arrived first determined the geographical position of Matadi, made some soundings to satisfy themselves of vessels of a large draught being able to land without considerable works, and reconnoitred the environs. From the first days of August work began; one study-gang walked in advance,

reconnoitring the country and determining rapidly, by means of the levelling compass, the zone of the ground to be surveyed. Three gangs, each composed of three engineers, followed and drew with the tacheometer the plan of the reconnoitred zone. Haussas, negroes of the Gold Coast, were employed as staff-holders. The zone on which the operations with the tacheometer were performed, varied, according to circumstances from 50 to 200 metres on both sides of the likely axis of the way. The progress of the work, which at the very beginning of the operations was only from 300 to 500 metres per brigade and per day, on the difficult ground near Matadi and Palaballa, soon increased to one or two kilometres, after the expedition having passed the mountainous region, and by way of exception was raised to four or five kilometres per day, the maximum space between the stations of the instrument being 300 metres. The operations on the ground continued in 1887 up to December, when the study had been carried on as far as Lukunga. The work then suffered an interruption of four months on account of the rainy season; nevertheless, a special gang continued working during January and February 1888, in order to execute near Matadi the survey of an alteration made in that region to the first direction-line. In May 1888, the staff having again their full complement, works were resumed. While the chiefs of the gangs went to reconnoitre previously the region which extends between the Lukunga and the Stanley Pool, the other engineers completed the works around Matadi. At the beginning of July the whole staff resumed the operations with the tacheometer. On the 4th November, 1888, the level was set up for the last time at Stanley Pool, and the engineers went back to Europe.

The railway which is proposed to be laid in the cataract region, according to the survey plans and estimates, will have a gauge of 75 centimetres, with steel rails weighing 23 kilos, steel sleepers at equal distances of 80 centimetres, and weighing 23 kilos, the whole of the line weighing 75 tons per kilometre. The total length of the line will be 435 kilometres. The laying of the first 26 kilometres only will offer some important difficulties, while the remainder of the line will be laid under exceptionally easy circumstances, either in plains by straight lines, or along the hill sides by means of curves of great radius. The earthworks of the first 26 kilometres not only will be much more considerable, but a great deal of it will have to be done by excavating the rock, while farther the cuttings can be proceeded with in argillaceous ground, and nearly always in sandy and friable earth.

If we except the first part there will be few constructive works, the most important of them being a bridge of 100 metres across the Inkissi, two bridges of 80 metres across the Mpozo and the Kwillu, and six bridges ranging between 40 and 60 metres. The others will have a length of from 5 to 20 metres only in the clear. The construction of the abutments of bridges will be everywhere very easy, as firm soil is to be met with at no great depth from the surface of the ground. Nearly everywhere, except on the first section, the nature of the soil will admit of bricks being made, and in the valleys of the Luima, of the Unionzo, Kwillu, and Inkissi, limestone is to be found in abundance. Fragments of quartzite and sand, everywhere to be met with, will supply the ballast.

The maximum of incline will be 46 millimetres per metre, and will be reached three times during the first portion, where as a rule steep inclines will be met with. Nevertheless it has been possible to combine the slopes and horizontals so as to render traction as easy as possible, and during the last 400 kilometres the slopes and inclines are very infrequent and generally insignificant. Likewise, in the first section curves are rather numerous and of short radius, although the latter will never be less than 50 metres. Thus all the difficulties of laying and working accumulate at the starting-point, a most fortunate circumstance, as the first section also offers greater

facilities for laying; and on the other hand, by establishing a twofold traction for the first 26 kilometres, and reorganising the trains beyond Palaballa, it will be possible to work the whole of the line under far greater economical conditions than if the working difficulties had to be dealt with at some distance from the starting-point.

The locomotives, when loaded, will weigh 30 tons, and drag, with the speed of 18 kilometres per hour, an average useful load of 50 tons.

The starting-point of the railway on the lower Congo will be at Matadi, a point which is easily reached by sea-going steamers, and where inexpensive works will easily enable those steamers to unload their cargo on wagons. The terminus of the railway at the Stanley Pool will be at Ndolo, at a little distance above Kinchassa, and also above all the rapids which hinder navigation in the cataract region. Beyond this point light-draught vessels can ascend the Congo and its affluents for an uninterrupted length of 11,500 kilometres. Ndolo is admirably situated for the building of spacious quays.

Matadi and Ndolo will be the two principal stations; a second-class station will be erected in the district of Kimpesé, where travellers will stop, as two days will be required to pass the distance between Matadi and Stanley Pool; the trains will not run by night. Three other stations will be established along the line—one at the Lufu, another at the Inkissi, and a third at Ntampa—thus dividing the total distance between the lower Congo and the Stanley Pool into five sections of an average length of 85 kilometres each, and each section being itself divided into four subsections by three halting-places, with water-tank and crossing-way.

To sum up, the general estimate of the scheme demands a capital of 25,000,000 francs, which will be sufficient to build the road, purchase the rolling stock, cover the general expenses both in Europe and Africa, and meanwhile, pay the interest on capital during the construction of the railway, which, according to estimate, will occupy four years.

The figure of 60,000 francs, or more exactly 58,500 francs per kilometre, for the Congo railroad, is a maximum price which has only been reached, on the one hand, because the construction really does, on one portion of the track, involve some difficulties; on the other hand, because the highest valuation has been adopted. When we look to the matter closely, we must even admit that the price we have named is a high one. For, as a matter of fact, the Congo railway is an exceptionally easy undertaking. The laying out of its course was only influenced by purely topographical considerations, and the surveyors had no troublesome allowances to make for connecting the road with any particular establishment for industrial, commercial, or even political purposes. There were no lands to purchase, besides which—and this is an important item to which I call your full attention—there are and there will be no side profits to be allowed for; the undertaking is, and will remain, completely independent from speculation, the cost of the railway, such as we give it, being strictly that established by the estimates.

Furthermore, the proposed railway is not a wide-gauge railway, but a narrow-gauge railway, adapting itself to all the variations of the ground it will travel over, and exactly befitting the commercial position of a country yet in its infancy. I remember the graphic words used by one of my colleagues on the Board of the *Compagnie du Commerce et l'Industrie* while we were discussing the width of the road, and I will repeat it to you: "What we want," he said, and we all agreed with him, "is a good and substantial iron track where locomotives and waggons may be set rolling."

The transport-power of the Congo railway, with its seventy-five centimetres gauge, between "bourrelets," will meet all present requirements, and will meet them for a large number of years to come.

The construction of the Congo railway will be proceeded with by the "Compagnie du chemin de fer du Congo," commanding a registered capital of one million pounds sterling, of which one-fifth has been subscribed by English capitalists, thanks to the spirited enterprise and the great authority of Sir William Mackinnon.

Thanks to the disinterested intervention of the Belgian Government, who have subscribed 400,000*l.* worth of shares which will never bear more than 3½ per cent. interest, and who forfeit all excess of profit in favour of the other shares, it will only require, in order that the ordinary capital invested in the undertaking may reap a return of 8 per cent., that our receipts shall reach 3,000,000 francs, an amount which, according to the terms laid down by the contract for the early period of the undertaking, will certainly be realised if the up traffic reaches 2,250 tons, if passenger traffic reaches the total figure of 300 up and down passengers, and if the railway, in its down journey carries 200 tons of ivory, 600 tons of gutta-percha, and 3000 tons of miscellaneous goods paying only 100 francs for carriage. These figures will undoubtedly be reached from the beginning. Even at the present time, 1800 tons are carried up the Congo, we only, therefore, provide for an increase of 450 tons within four years. The 200 tons of ivory above-mentioned, merely represent what is actually conveyed by native carriers; as to the 600 tons of gutta-percha, one single branch of the Compagnie du Haut Congo—the Luébo branch—is in a position to purchase 240 tons per annum; and the 300 remaining tons will be provided by palm-oil, gums, wood for building purposes, &c.

The opportunities afforded to communication by the 11,500 kilometres of practicable waterway of the Upper Congo and its tributaries will, indeed, enable us to drain towards the Stanley Pool, for carriage by the railway, the various exchangeable commodities which the immense territories of the Upper Congo abundantly produce.

The Physical Basis of Commercial Geography. By HUGH ROBERT MILL, D.Sc., F.R.S.E.—A necessary preliminary to the study of commercial geography is a full acquaintance with topography, especially with the names and positions of all commercial towns. A necessary accompaniment to the study of commercial geography is a knowledge of the ever-varying relations between regions of supply and demand, the incidence of tariffs, and the political and social condition of countries. The physical basis of commercial geography, which underlies and gives unity to the whole subject, is a knowledge of the resources of the earth as regards the various existing forms of matter and modes of energy, the best means of separating, combining, and modifying these so as to produce commodities, and the way in which commodities can be best transported. Commerce being the artificial redistribution of the matter and energy of the world, a knowledge of the general properties, and the unchangeable laws of matter and energy should take a chief place in the training of commercial men. A general acquaintance with this practical science, which may be termed *Applied Physiography*, or *Practical Earth Knowledge*, ought to be possessed by all merchants, and a special branch should be familiar to each. Amongst the advantages which would thus be gained are:—

- (1) The merchant would understand the principles of the production and manufacture of his goods.
- (2) He would know in many cases, without aimless and extravagant experiments, where it is possible to produce any special commodity in great abundance.
- (3) He could, to a great extent, anticipate the frequent changes in staple commodities by knowing what other commodities it is possible to produce in the regions now yielding the staple only.
- (4) He would understand the best and shortest routes between trade centres.

Illustrations and arguments showing the importance of these statements were given in the paper, and a large map of the commercial development of the world was shown.

Buganda (Uganda). By the Rev. R. P. ASHE.—Geographical investigation includes much more than the merely physical features of any country. Speke's discovery of the source of the Nile was hardly so wonderful as his bringing to light the nations and kingdoms about the shores of the Victoria Nyanza. Events of recent years add a deepening interest to Buganda. The author referred, among other matters, to Livingstone's death, Stanley's travels, the Nyanza mission of the Church Missionary Society, Gordon's death, and Stanley's effort to relieve Emin Pasha. He spoke of the English and Germans competing for this market for European manufactures, and key to the lake regions. He then went on to describe the great lake and its islands; tropical forest scenery; the contrasts between Buganda and districts further south; the nature of the country; the products of the soil; roads; villages; buildings.

As to the people, the author pointed out that the non-negro element is derived from the royal Bahuma (Wahuma) tribe. He then described the Bahuma; referred to the great native slave and cattle raids; the organisation of the Buganda people, kings, chiefs, peasants, slaves, manners, and customs. He then spoke of the African problem; the Arab trader; slaves; ivory; guns.

The Commercial Geography of Yoruba, West Africa. By His Excellency ALFRED MOLONEY, C.M.G., Governor of Lagos.—In December of last year, the Royal Geographical Society was favoured by Mr. H. H. Johnston, then Vice-Consul for the Bight of Benin and Biafra, now Consul for Mozambique, with an able paper on the Niger Delta. It embraced interesting and valuable information on the estuaries of that highly important western waterway to the interior of tropical Africa, and included the Benue, which is acknowledged as an independent river, although connected by inland lagoons with Lagos on its west, and with the Niger to its eastward.

Yorubaland, on which and on its connection with and value to the Colony of Lagos, I propose to dwell, may be said to be now comprised of the area situate south of the ninth degree of N. lat., between the Ewe (Whemi or Dahomey) territory and the Niger main stream, the Nun, continued by its debouchure the Forcados.

It may be more clear if I say that the territorial wedge lying between the Volta and Niger rivers, speaking generally and linguistically, is divided between the Ewe or Dahomey, and Yoruba speaking peoples, the former occupying the western, and the latter the eastern half, the line of contiguity being represented by the degree of longitude of the mouth of the Ajera river continued to the territory of the kingdom of Barba, with which the Royal Niger Company has treaty relations.

The area of Yoruba is estimated to be between 25,000 and 30,000 square miles, of which 1069 square miles make up the Colony and Protectorate of Lagos.

The lagoons or inland waterways to which I have referred run parallel to the coast-line, especially along its Guinea portion, and present an interesting study in many directions, especially as regards their formation; from their openings into the sea, to a distance of some 30 miles, they are affected by the tide; beyond, the water is generally deep and fresh; on both sides the land is rich with vegetation, and offers a genial home for anything tropical. The forests which fringe these waterways are rich in orchids, of which I have been fortunate in securing many rare and beautiful species. Amid the rich and varied vegetation presented on the lagoon bank are very noticeable various palm-trees, the mangroves, the companions of brackish water, a willow-like shrub called "saltbush," from which, in the vicinity of Benin as elsewhere, a native salt is manufactured, and miles of the *Raphia vinifera* (Nature's comparatively harmless distilleries), the pericarp of which pounded is used

in still narrow creeks to stupefy or poison fish (as is the case with many other vegetable products).

The original coast-line here must have been the shore of the mainland, since become the continental edge of the innermost run of such waters. The strips of land that now sandwich-like intervene between the sea and the mainland, have been, it would appear, formed by the continuous action of the surf, the current that crosses the Atlantic from the Gulf Stream and the prevailing wind, upon the debris carried down, especially in the floods, by the many intersecting streams and rivers.

Such lagoons run along parallel to the sea for hundreds of miles, and connect with two slight and removable interruptions the Volta and the Oil Rivers; the area they embrace represents the malarial belt, so fatal to Europeans; the further inland therefrom one gets, the more healthy, but perhaps the more hot the country becomes.

On the occasion of a recent visit I paid to the eastern district of the colony, I ascertained personally that with the removal of some floating grass islets—an easy matter—the passage through from Lagos by inland waters to the Benue river, a distance of some 160 miles, was not only practicable but easy for steam-launches, and probably for something larger in time. When such ways of communication are generally opened up and definitely established, the open surf-tossed roadsteads and dangerous bars for which West Africa is notorious can to a great extent be ignored.

The seasons of West Africa are known as the *dries* and the *rains*: the former in Yoruba beginning with August and ending with February, the intervening months representing the latter. In 1887 the total rainfall at Lagos showed 70·8 inches, of which 33·17 fell in June, June and July being the two wettest months of the year. The average minimum temperature of the year was 65° and the maximum 92°. The warmest month was November, for which the average heat was returned as 96°. The mean barometrical pressure was 30·01, the lowest monthly mean being in November, when it was 29·59, the highest being 30·51 for October.

In 1862, when the British assumed active control of its seaboard, the value of the imports from and exports to Yoruba via Lagos, totalled 139,865*l.*: in 1887 they reached 906,812*l.*, or nearly a million of money, our direct interest in which as regards the United Kingdom, was represented by 727,191*l.*, or speaking generally, I may say that of a trade of one million sterling seven-ninths benefited this country. The direction of the exports of West Africa has been, however, affected by the foreign colonisation craze: we have ceased to be the commercial monopolists we have been, and must now face international competition.

Of more direct interest to this important industrial and coal centre, Newcastle, I may perhaps mention that while for our West African colonies the total tonnage of vessels entered and cleared—exclusive of coasting traders—reached in 1878 1,020,135 tons, made up of 761,835 for steam, and 258,300 for sailing vessels, it has been returned for 1887 as 1,551,372 tons, viz. 1,494,469 under steam, and 56,903 under sail. Thus we observe that while the steam carrying power has doubled itself in ten years, the tonnage of sailing vessels has fallen over 77 per cent.; commercial competition more keen and international, and shallow-draught ocean steamers capable of crossing bars, and of delivery inside, have chiefly caused this falling off.

Of the steam carrying power (which has been mainly in the hands of the African and British and African Steamship Companies of Liverpool, to which West Africa owes much for its present condition of progress) in 1878, 798,702 tons were British, and 221,433 foreign; in 1887 the former had increased to 1,189,188 tons, and the latter to 362,184. The gross tonnage for the colony of Lagos, which, as I have already said, is practically the seaboard of Yoruba, was in 1878 362,722 tons, and in 1887 518,643, or over one-third of the total tonnage of our West African dominions. This tonnage was made up in the former year of 306,329 for British, and 56,393

foreign shipping; for 1887 we can substitute 375,667 and 142,976 tons respectively. It will be remembered that Lagos only entered into colonial existence in the latter half of 1861; since which its carrying power has increased five times.

Next, as regards our direct coal supply, three-fourths come from Great Britain, our only rival in Lagos as a national importer being Germany, which is also a keen and growing competitor in other commodities along Western Africa.

The port of Lagos constitutes the only safe harbour along some hundreds of miles of coast, and its trade must have a grand future, dependent, however, on the peace of the surrounding and interior tribes, and on the industrial education of Yorubas. The definite international understanding now arrived at as to areas of influence to be observed and respected must also considerably affect the situation for general good. The supply of docking accommodation, and of deepening the approach to the harbour, are questions that have not been overlooked, and are still under consideration.

Turning next to the commercial geography of Lagos, we see first and foremost palm oil as the staple of trade, and a native manufacture. It is the yield of the pericarp of the nut of the *Elais guineensis*, which may be said to be confined to Negroland, and appears to have been providentially substituted for the slave trade, which this manufacture followed. This industry alone among many others, offers a good answer to the revilers of the Negro for his alleged laziness or indifference; what he has done for commerce in this article alone speaks volumes.

In 1790, or nearly 100 years ago, we find the quantity imported from West Africa into the United Kingdom came only to 130 tons in round numbers; in 1887 it reached nearly 50,000 tons, to which it leaped from 13,500 tons, which it represented in the year of the abolition of slavery, viz. 1834; of this quantity, nearly 50 per cent. reached England from the continent of Europe, in addition to the imports thence of this commodity as candles and in other forms.

In comparatively recent years the palm kernel industry was developed, which for 1887 amounted to 33,537 tons as regards imports into the United Kingdom, of which 19,334 tons came from foreign West Africa.

Of these commodities from Yoruba through the colony of Lagos, there are now exported between 11,000 to 12,000 tons of oil, or one-third of the output of the Oil Rivers (the Nun excluded), and from 40,000 to 50,000 tons of kernel, viz. some 15,000 to 20,000 more than the export of those rivers.

The growing rivals of palm oil in the form of petroleum, tallow, cotton-seed, linseed, and ground-nuts, have reduced of late considerably its value per ton, which was 52*l.* not many years back.

The *Elais guineensis* may be said to be confined within a belt of 100 miles from the coast-line. Within the same area, the coco-nut, to which little attention has been paid, grows luxuriantly. The conditions of soil on the strips of land that run for hundreds of miles along West Africa between the lagoons and the sea, are so favourable to the growth of this tree, there should be in time a large export trade in copra, oil, and coir, for the local manufacture of which fair prospects even now offer. Towards such an end, by way of example, the Government of Lagos has established model plantations, now containing over 40,000 young trees and seedlings. This growth systematically proceeds, and the example set is followed. In this culture the Roman Catholic Mission at Topo is doing good work.

Other oil-yielding seeds, which might be produced generally in West Africa to any extent, are ground-nut, cotton, beni, niko, m'poga, dika, purguera, shea butter, &c.

Then as regards rubber and gum industries, the country is rich in vegetation yielding such commodities, and must follow the profitable example set by Sierra Leone, the Gold Coast, and other parts of West Africa. Yoruba offers a rich field for the development of an export trade in gum. It is there generally known as *ogea*, and specimens have been valued at from 90*l.* to 120*l.* per ton. It possesses the

advantageous property of requiring 600° F. to run it for varnish manufacture. According to Professor Oliver, this gum is a *Daniellia*. *Landolphas* and fig-trees abound, and invite systematic and careful tapping. Although the celebrated and valuable vine which yields the best white rubber that finds its way into the English markets has its home in Yoruba and on the Niger, after which it has been named *Landolphia Owariensis*, this commodity is only now appearing among the exports of those parts.

To explain what can be done in such matters, I may mention that in 1882 the question of the development of a rubber trade was taken in hand by the Government of the Gold Coast. The result speaks for itself:—

						£	s.	d.
In 1882 value exported	..	..	..	..	..	0	12	6
" 1883	"	"	..	..	..	2,372	0	0
" 1884	"	"	..	..	..	13,620	0	0
" 1885	"	"	..	..	..	30,235	0	0
" 1886	"	"	..	..	..	69,911	0	0
" 1887	"	"	..	..	..	62,430	0	0

Northern Yoruba, where the country is generally open, represents the cotton, shea butter, and indigo area. Manufactured cotton as an export is an article of deep interest to this country, and a rich market for its consumption Africa offers for a time, but not of the quality which, like the proverbial umbrella, is only intended for sunshine. The sized-article now put upon the people in many places will not always be tolerated, nor will the deceptive lengths in the shape of short folds. The retention and growth of this trade is in our own hands, and must depend on ourselves. Africa should have good quality and full measure. Of our manufactured cotton goods, Yoruba alone, through the colony of Lagos, takes annually to the extent in value of one-fifth of a million sterling. English cotton goods, inferior as they have become, still command its markets. It must be seriously considered how long they will continue to do so, or be tolerated by the people.

The raw cotton exported into the United Kingdom from Lagos in 1873 was valued at 51,618*l.*; in 1887 the export had dwindled down to a value of 2093*l.* The low prices for the past few years—in fact, since the American war—realised in the European markets for West African cotton have militated against its supply, and consequently there has not been the same attention turned to its growth, which is mainly confined at present to supply for native manufacture. Its short staple has also told against it. Intertribal wars and slave-hunting have also opposed its growth.

For its blue dyeing Yoruba is also famous: over it are found many botanical species yielding the indigo of commerce. *Indigofera anil*, the true indigo, is found wild and in abundance. Specimens of indigo from the vicinity of the Niger have been pronounced as worth 4*s.* to 4*s.* 6*d.* per lb.

Yoruba is noted for many bast and fibre-yielding plants. The *Sansevieras* have their home there. Specimens of the fibre of the *S. guineensis* should, if properly prepared and carefully shipped, realise 20*l.* to 30*l.* per ton. The jute-like *Honkenya ficifolia* is common, and specimens of its fibre have been valued at 16*l.* to 17*l.* per ton. Another tiliaceous fibre, named vulgarly *Toja*, has been pronounced as worth 17*l.* to 18*l.* per ton. The pineapple grows in wild luxuriance.

For the activity displayed at Lagos in the development of the economic botany of the country, the Director and staff of the Royal Gardens, Kew, deserve the greatest credit; for the Director's courteous instruction and useful co-operation Lagos and Yoruba should be grateful; and in their relations to our colonies, the Royal Gardens at present take the place and do the duty of a Commercial Geographical Society—a self-imposed and indeed arduous task.

With Lagos the attractive and commercial centre of Yoruba the main land trade routes to the Niger are:—

1. (a) Abeokuta, up the Ogun river, Iseyin, through the Barba or Borgu

country to Busah or Busang on the Niger. (b) Abeokuta, Oyo, Ogbomoso, Ilorin, and Rabba on the Niger.

2. Ikoradu or Ode-Ketu (in Jebu), Ode Oru, Ibadan, Ilorin, and Rabba.

3. Artizere, Itebu, Ondo, Ilesha, Ilorin, and Rabba.

4. Benin through the countries of the confederated States known as Ekite-parapo, Ilorin, Rabba.

I would here add also that these routes vary in length from 200 to 300 miles, are long and well established, and connect populous centres which any railway system contemplated should connect. The extension to Yoruba of such a connection would alter the face of the country, open up rich undeveloped regions, prevent intertribal wars, and get over the difficulty and loss caused by the delay in getting to the coast the produce of the middle Niger above Lokoja, at the confluence of the Binue, in consequence of the want of water sufficient for steamer traffic, experienced between February and June in each year. In time it may be found practicable for the colony of Lagos to co-operate with the intermediate Native States and the Royal Niger Company to work out the problem. Light, inexpensive railways, with narrow gauge, as were resorted to with profit in opening up and developing parts of India during Lord Mayo's administration, would suffice. The country is well timbered, flat or gently undulating, and there would be little necessity for bridging or cutting.

For West Africa the seashore or sandbeach policy period has been gone through and fortunately passed: the value of our possessions depends on their trade, which means an open and settled interior: cut them off from the interior and they are practically blocked as regards progress, and are occupied in struggling to make revenue meet the bare cost of administration: connect them by a policy based on consideration, conciliation, agriculture, and the repatriation of negroes from the Western Hemisphere, their future will be great and far reaching. By native agency alone can Tropical Africa be gradually and definitely developed on any permanent basis.

The Government has never lost sight of the original objects of the acceptance of the cession of Lagos, viz. to assist, defend, protect, and advance the inhabitants, to put an end to the slave trade, not only within the area ceded, but in the neighbouring countries, and to prevent intertribal wars.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian R.G.S.*)

EUROPE.

Blink, [Dr.] H.—*Der Rhein in den Niederlanden.* Stuttgart, Engelhorn, 1889: 8vo., pp. 70. Price 4s. 2d.

This is the second part of volume iv. of the 'Forschungen zur deutschen Landes- und Volkskunde,' edited by Professor Kirchhoff. As the title implies, it is a monograph on the Rhine in the Netherlands. The author (Dr. Blink) lays down a few preliminary principles for the investigation of the geography of a river. He then considers the horizontal and the vertical forms of the Rhine in the Netherlands. He next examines the height of the land along the Rhine, and its arms with respect to the position of the water. Then follow a section on the drainage of the Netherlands, and the Rhine and its arms, and another on the subterranean connection between the Rhine, the Waal, and the land through which they flow. The river is then regarded in relation to the climatic conditions and means of draining off the water of the region; the variations in the river, drainage and distribution of the water of the Rhine and its branches.

Then follow sections on the mud of the Rhine, the history of the Rhine delta, history of the connection between the Rhine and the IJssel, of the Waal, and various other special features, a concluding section dealing with the Rhine as an international river.

Nordhoff, J. B.—Haus, Hof, Mark, und Gemeinde Nordwestfalens, im historische Ueberblicke. Stuttgart, Engelhorn, 1889: 8vo., pp. 35. Price 1s. 3d.

This is one of the memoirs issued by the Central Commission on the Scientific Geography of Germany. It deals with the ancient conditions of Northern Westphalia, the customs of the people, the disposition of their farms, forests and meadows, the nature of their agriculture, and other matters throwing light on the development of the country.

ASIA.

Bastian, A.—Indonesien, oder Die Inseln des Malayischen Archipel. IV. Lieferung. Borneo und Celebes. Mit drei Tafeln. Berlin, Dümmler, 1889: 8vo., pp. cviii. and 74. Price 7s.

This is the continuation of Dr. Bastian's valuable series of memoirs on his investigations in the Malay Archipelago. The interest is mainly anthropological. An analytical index of subjects will be of great service when the series is concluded.

Bell, Horace.—The Great Indian Desert. 'The Asiatic Quarterly Review,' July 1889, pp. 117-131. 8vo.

Bunsen, Ernest de.—The Origin of the Saracens. 'The Asiatic Quarterly Review,' July 1889, pp. 132-143. 8vo.

Derenbourg, Hartwig.—Ousâma Ibn Mounkidh, un Emir Syrien au Premier Siècle des Croisades (1095-1188). Première partie, Vie d'Ousâma (Chapitres I.-V.). [Publications de l'École des Langues Orientales Vivantes. 11^e Série.—Vol. XII. (1^{re} Partie).] Paris, E. Leroux, 1889: large 8vo., pp. x. and 202, plate. [Presented by the French Minister of Public Instruction.]

[India.]—Seventh Tour of His Excellency the Right Honourable Lord Connemara, G.C.I.E. Malabar, South Canara, Goa, Bellares, Cuddapah, North Arcot, and Mellore.

These notes are by Mr. J. D. Rees, who accompanied the Governor of Madras, in his official capacity, in October 1888, to Calcutt, visiting various places in the coast, and crossing the country from Goa to Madras. The notes are interesting, and contain many details on the places and people visited, which render them of value.

Mukharji, T. N.—Art-Manufactures of India. Calcutta, 1888: 8vo., pp. 451, map and plate. [Presented by the Record Department, India Office.]

This volume, which was specially compiled for the Glasgow International Exhibition of 1888, contains a brief account of the most important art-manufactures of India. It is divided as follows:—I. Fine Arts. II. Decorative Art. III. Musical Instruments. IV. Jewellery. V. Manufactures in Metal. VI. Art Manufactures in Wood. VII. Art Manufactures in Stone. VIII. Lapidary's Work. IX. Ivory, Horn, and Shell Manufactures. X. Pottery. XI. Glass Manufactures. XII. Leather Manufactures. XIII. Basket-ware. XIV. Textile Manufactures.

Nalivkine, V. P.—Histoire du Khanat de Khokand. Traduit du Russe, par Aug. Dozon. [Publications de l'École des Langues Orientales Vivantes. III^e Série.—Vol. IV.] Paris, E. Leroux, 1889: large 8vo., pp. viii. and 272, map. [Presented by the French Minister of Public Instruction.]

Mainly historical, but contains a geographical and ethnographical introduction.

Sommier, Stephen—Sirieni, Ostiacchi e Samoiedi dell' Ob. Prima parte. Firenze, 1887: 8vo., pp. 168.

—— Note di Viaggio. Firenze, 1889: 8vo., pp. 87.

—— Fra I Basckiri. (Capitolo di un libro inedito.) 8vo., pp. 44. Estratto dall' "Archivio per l'Antropologia e la Etnologia" di Firenze, vol. xi. fasc. 3°.

—— Due Comunicazioni fatte alla Società d'Antropologia sui Lapponi e sui Finlandesi Settentrionali. 8vo., pp. 61. Estratto dall' "Archivio," &c., vol. xvi. fasc. 1°, 1886.

—— Prima Ascensione Invernale al Capo Nord e Ritorno attraverso la Lapponia e la Finlandia. Roma, 1886: 8vo., pp. 22.

—— **ed Enrico H. Giglioli**.—Il Dottor Finsch alla Nuova Guinea. Firenze, 1889. Estratto dell' "Archivio," &c., vol. xix. fasc. 2°. [All presented by Signor Sommier.]

These various publications, as will be seen, are of a specially ethnological interest, most of them being illustrated with portraits, views, and maps. Signor Sommier's work on Siberia was noticed in the 'Proceedings' for 1885, p. 404. To any student of the regions with which Signor Sommier deals, no doubt these careful memoirs will be found of service.

AFRICA.

Carvalho, Henrique Augusto Dias de.—L'Influence de la Civilisation et de la Colonisation Latine et surtout Portugaise en Afrique. Lettre à sa Majesté le Roi des Belges. Lisbonne, Imp. Franco-Portugaise, 1889: 8vo.

AMERICA.

[**America**.]—The National Geographic Magazine. Published by the National Geographic Society, Washington, D.C. Vol. i. No. 2, 8vo., pp. 99-181.

From the second part of the organ of the New American Geographical Society, we learn that the number of members is already 209. The principal paper is the Annual Address of the President, Mr. Gardener G. Hubbard, the subject being "Africa, its Past and Future." There are also the usual reports of the Vice-president; The Geography of the Land, by Herbert G. Ogden; The Geography of the Sea, Lieut. G. L. Dyer (also issued separately); The Geography of the Air, by General A. W. Greely; and The Geography of Life, by C. Hart Merriam.

[**Bolivia**.]—Nociones de Geografía de Bolivia, aprobadas y adoptadas por el Consejo Universitario y el H. Consejo Municipal de Chuquisaca. Redactados por el Serjento Major de Ejercito Justo Lecque Mareno. Quinta edicion, corregida. Sucre, Morzo, 1889: small 4to., pp. 56. [Presented by the Author.]

This is a systematic though brief account of the geography of Bolivia, arranged in the form of a text-book; it contains a fair account of the present condition of the country.

[**Brazil**.]—Le Brésil en 1889, avec une Carte de l'Empire en chromolithographie, des tableaux statistiques, des graphiques et des cartes. Ouvrage publié par les soins du Syndicat du Comité Franco-Brsilien pour l'Exposition Universelle de Paris avec la collaboration de nombreux écrivains du Brésil sous la direction de M. F.-J. de Santa-Anna Nery. Paris, C. Delagrave, 1889: 8vo., pp. xix. and 699. [Presented by Monsieur James Jackson.]

Bristowe, Lindsay W., and Wright, Philip B.—The Handbook of British Honduras for 1889-90, comprising Historical, Statistical, and General Information concerning the Colony. Edinburgh and London, W. Blackwood and Sons, 1889: 8vo., pp. xiv. and 256, map. Price 6s. [Presented by the Publishers.]

This edition contains 18 pages in excess of the previous one. The additional matter includes a table of chronological events for 1888; an account of the

expeditionary party which recently explored the hitherto unknown regions of the Cockscomb Mountains; and a description of the town of Corosol. The map has been enlarged and corrected by Mr. W. Miller, Assistant Surveyor-General.

[**British Guiana.**—*Timehri*. Being the Journal of the Royal Agricultural and Commercial Society of British Guiana. Vol. iii., new series, part i., June 1889. London, Stanford: 8vo., pp. 208.

Among the articles in this number there is one of much interest on the life and work of the Schomburgks in Guiana, by Mr. J. Rodway. Mr. J. E. Tinné contributes a few suggestions on opening up the country to industrial development. Mr. Barrington Brown has a first instalment of the British Guiana Museum Catalogue in the shape of a list of the rocks and minerals of the colony. Mr. H. I. Perkin has a short article on the settled portions of Barema, Waini, and Amakure rivers, while the editor, Mr. Quelch, gives an interesting account of a recent journey made by himself along the Essequibo and Potaro. This included a visit to the famous Kaieteur Falls, concerning which and the neighbouring country Mr. Quelch gives some fresh details.

Bruyssel, Ernest van.—*La République Orientale de l'Uruguay. Découverte et Colonisation.*—Notions générales.—Description du pays.—Agriculture.—Industrie.—Relations commerciales.—Situation financière.—Voies de Communication.—Avantages offerts à l'Immigration Européenne. Bruxelles, Th. Falk, 1889: 8vo., pp. x. and 247. [Presented by the Publisher.]

[**Guatemala.**—*Exposition Universelle Internationale, Paris, 1889. République de Guatemala (Amérique Centrale). Catalogue des Exposants avec une Introduction*, par le Dr. Gustave E. Guzman, suivi d'une Notice sur certains produits spéciaux exposés par Adolphe Boucard. Tours, Imp. Paul Bousrez: 8vo., pp. 117, portrait. [Presented by Monsieur Crisanto Medina, Ministre Plénipotentiaire de la République de Guatemala, through Monsieur James Jackson.]

Includes a description of the country.

Horsford, Eben Norton.—*The Problem of the Northmen*. A letter to Judge Daly, the President of the American Geographical Society, on the opinion of Justin Winsor, that "though Scandinavians may have reached the shores of Labrador, the soil of the United States has not one vestige of their presence." Cambridge, Wilson & Son, 1889: 4to., pp. 28. [Presented by the Author.]

Mr. Horsford attempts to prove, in opposition to Mr. Winsor, that Lief Erikson did land in what is now the United States, and that remains of the houses built by him are still to be found on the banks of the Charles river, at Cambridge, Massachusetts. Mr. Horsford's letter is accompanied by several large-scale maps and illustrations.

[**Mexico.**—*Noticia historica de la riqueza Minera de Mexico y de su actual estado de explotacion . . . por . . . Santiago Ramirez*. Mexico, 1884: 8vo., pp. 768.

— *El Algodonero*. Memoria escrita por Donato Gutierrez. Mexico, 1885: 8vo., pp. 30.

— *La Ramirita*. Nueva especie mineral dedicada al Sr. Ingeniero de Minas D. Santiago Ramirez descubierta descrita y analizada por el Profesor Mexicano D. Miguel Velazquez de Leon. México, 1885: 8vo., pp. 32, portrait and plate.

— *A Brief Report on the Organization, Objects, and Development of the Works of the Geographical Exploring Commission in the Republic of Mexico*. By Agustin Diaz, c.e., Director of the Geographical Commission. New Orleans, L. Graham & Son, 1885: 8vo., pp. 14.

— *Étude géographique, statistique, et historique des États Unis Mexicains*, par Antoine Garcia Cubas. Mexico, 1889: 8vo., pp. xiv. and 415.

[**Mexico.**—Estudio sobre las Aguas Medicinales de la Republica Mexicana por el Dr. José G. Lobato. México, 1884: 8vo., pp. 213, plates.

— Reseña sobre el cultivo de algunas Plantas industriales que se explotan ó son susceptibles de explotarse en la República formada por José C. Segura y Manuel D. Cordero por encargo de la Comisión Mexicana para la Exposición de Nueva Orleans. México, 1884: 8vo., pp. iii. and 339, plates.

— Estudio químico-industrial de los varios productos del maguey Mexicano y análisis químico del aguamiel y el pulque. Trabajos hechos por el Dr. José G. Lobato quien los dedica al C. General Porfirio Díaz para la Exposición Universal de Nueva Orleans. México, 1884: 12mo., pp. 191.

— Cuadro Geográfico, Estadístico, Descriptivo ó Histórico de los Estados Unidos Mexicanos, por Antonio García Cubas. México, 1884: 8vo., pp. xxxi. and 474, map and plate.

— Rapport du Général Porfirio Díaz Président des États-Unis Mexicains à ses compatriotes. Mexico, 1889: 8vo., pp. 45.

— Estados Unidos Mexicanos. Secretaría de Fomento, Colonización, Industria y Comercio. Sección 4ª. Datos Mercantiles, compilados por Ricardo de María Campos. México, 1889: 8vo., pp. xvi. and 472.

[The above eleven works, relating to Mexico, were presented by Monsieur Manuel Díaz Miniaga, Commissaire Général du Mexique, through Monsieur James Jackson.]

[**Paraguay.**—El Paraguay. Memoria bajo el punto de vista industrial y comercial en relación con los países del Plata, por Benigno T. Martínez, Cónsul de la República en el Uruguay. Asunción, 1885: 8vo., pp. 173.

— La République du Paraguay. Résumé statistique. Asunción, Fischer & Qell, 1888: large 8vo., pp. 16.

— La République du Paraguay . . . par Matias Alonso Criado. Traduit de l'Espagnol . . . par Max Winsweiler. [Text and map in one.] Bordeaux, R. Coussan & F. Constatat, 1889: large 8vo.

Treats of Paraguay under a variety of aspects, including its situation, extent, population, national administration, commerce, climate, immigration, &c.

[The above three works relating to Paraguay were presented by Monsieur James Jackson.]

Pector, Désiré.—Indication approximative des vestiges laissés par les Populations Précolombiennes du Nicaragua [with continuation]. Paris, 1889: sm. 8vo., map and plates. [Presented by the Author.]

[**Santo Domingo.**—La République Dominicaine à l'Exposition Universelle de Paris. Havre, Imp. Mandet & Godefroy, 1889: 8vo., pp. 48, illustrations.

Includes a brief description of the Republic of Santo Domingo, its Climate, Agriculture, Industry, Commerce, Immigration and Political Organisation, Provinces, Maritime Districts, and Principal Towns.

— La Republica Dominicana. Reseña General Geografico-Estadística, por José Ramon Abad. Santo Domingo, Imp. de Garcia Hermanos, 1889: 8vo., pp. 400 and xxviii.

The first part of this work is occupied with a geographical description of the country; part ii. with the political and social organisation; and part iii., the productive forces.

— République Dominicaine. Exposition Universelle. Paris, 1889. Notice sur la Commune de San Cristóbal, Province de Santo Domingo, République Dominicaine, accompagnée d'une Carte Géographique par H. Thomasset, ingénieur.

Octobre 1888. ——— Noticia sobre la Comun de San Cristóbal, Provincia de Santo Domingo, Republica Dominicana, acompañada de una carta geográfica, por M. Thomasset, ingeniero. Octubre de 1888. Santo Domingo, Imp. de Garcia Hermanos, 1889: 4to., pp. 54.

[The above three works were presented by Monsieur le Baron de Alméda, Ministre Plénipotentiaire de la République Dominicaine, through Monsieur James Jackson.]

[Salvador.]—Catálogo Oficial de los productos que la República del Salvador envía a la Exposición Internacional de Paris de 1889, con un cuadro estadístico é historial de todas estas producciones por el Dr. D. David J. Guzmán. San Salvador, Imp. Nacional, 1888: large 8vo., pp. 123.

——— Apuntamientos Estadísticos sobre la República del Salvador, escritos por Rafael Reyes, Director-General de Estadística. Trabajo destinado á dar una idea del país en la Exposición Universal de Paris en 1889. San Salvador, Imp. Nacional, 1888: 8vo., pp. 104.

This work deals with the Republic of Salvador under a variety of aspects, including its geographical position, area, population, climate, political organisation, ways of communication, distances, commerce, flora and fauna, &c., &c.

[The above two works were presented by Monsieur Eugène Pector, Commissaire-Général de la République de Salvador, through Monsieur James Jackson.]

[Venezuela.]—Notice politique, statistique, commerciale, etc., sur les États-Unis du Vénézuéla. Paris, Paul Dupont, 1889: 12mo. [Presented by Monsieur James Jackson.]

A statistical annuary of the United States of Venezuela in five different languages—French, English, Spanish, German, and Italian—accompanied by a map of the Republic.

AUSTRALASIA.

Cook, Samuel.—The Jenolan Caves. An Excursion in Australian Wonderland. London, Eyre & Spottiswoode, 1889: small 4to., pp. 190. [Presented by the Publishers.]

The Jenolan Caves, which are described in graphic detail and amply illustrated in Mr. Cook's volume, are in the Blue Mountains, about 70 miles west of Sydney, in N. S. Wales. They are found in a limestone "dyke," and to judge from Mr. Cook's description, deserve all the praise he gives them for fantastic beauty.

OCEANIA.

[Samoa.]—[United States documents relating to affairs in Samoa. April 2, 1888; December 22, 1888; January 16, 1889.] 8vo.

Chiefly occupied with political matter, but containing incidental notices of the islands, their present condition, &c., illustrated with maps.

GENERAL.

Chisholm, Geo. G.—Handbook of Commercial Geography. London, Longmans & Co., 1889: 8vo., pp. x. and 515. Price 16s. [Presented by the Publishers.]

Mr. Chisholm's 'Handbook of Commercial Geography' is what any such handbook must be if it is to be of practical utility: it is of considerable size and abounds with details, mainly of the right kind. Commercial geography can hardly be regarded as an elementary subject. True, the various applications of geographical knowledge to human interests may be indicated even at an elementary stage of the subject, but the special application to commercial purposes must necessarily enter into detail if it is to be of real utility to those

actively engaged in commerce. If geography, as a branch of knowledge, were taught as it could be in our schools and colleges of all grades, the information and the knowledge of laws and principles thus acquired could be easily applied to any department; the special details need not be difficult of acquisition. For any one to appreciate thoroughly the details with which Mr. Chisholm deals, a preliminary knowledge of the general subject is necessary; a knowledge of what Dr. Mill calls the physical basis of commercial geography. This, however, is rarely to be expected. At the same time, the treatise is intelligible enough in itself, and no better text-book of the subject could be had for such institutes as deal with commercial geography, or for private individuals desirous of obtaining a general knowledge of the subject. Taking the book as a whole, probably no handbook of commercial geography in any language is equal to it. Mr. Chisholm devotes about 50 pages to a statement of general facts relating to the production, distribution, and exchange of commodities, dealing very briefly with such subjects as climate, soil, irrigation, labour, machinery, transport, language, &c. He then devotes 150 pages to the commercial geography, i.e. the geographical distribution, of commodities. This is a department of the subject of the first importance. Within the space at his disposal Mr. Chisholm treats the various products dealt with satisfactorily, and has evidently taken great pains to collect his information and to test its accuracy. He divides the subject into I. Commodities dependent directly or indirectly on Climate; II. Products of Fisheries; III. Mineral Products; IV. Manufactured Articles in which various Materials are used. Under the first head, of course, the various food products occupy a large space. The second part of the Handbook, covering 230 pages, deals with the separate continents and their divisions. The information here given will form a useful groundwork. For practical purposes a detailed handbook to each country, or at least each distinct region, is required. The appendix contains a number of very judiciously arranged statistical tables. There are about 30 maps illustrative of the various aspects of the subject dealt with.

[**Dépôt de la Guerre.**]—Ministère de la Guerre. Bibliothèque du Dépôt de la Guerre. Catalogue. I., II., III., VI. Paris, Imp. Nationale, 1883-1888: 8vo., pp. (vol. i.) 496, (vol. ii.) ii. and 555, (vol. iii.) ii. and 594, (vol. vi.) ii. and 517. [Presented by the French Minister of War.]

Deutsches Meteorologisches Jahrbuch für 1887. Beobachtungssystem des Königreichs Preussen und benachbarter Staaten. Ergebnisse der Meteorologischen Beobachtungen im Jahre 1887. Herausgegeben von dem Königlich Preussischen Meteorologischen Institut durch Wilhelm von Bezold, Direktor. Berlin, A. Asher & Co., 1889: 4to., pp. xlviii. and 287, map.

Dyer, [Lieut.] George L.—*Geography of the Sea.* 1859, 8vo., pp. 16. [Presented by the Author.]

Fiorini, M.—*Le Proiezioni Cordiformi nella cartografia.* Roma, 1889: 8vo., pp. 28. [Presented by the Author.]

[**International Geodetic Association.**]—*Verhandlungen der vom 17-23 September 1888 in Salzburg abgehaltenen Conferenz der Permanenten Commission der Internationalen Erdmessung redigirt vom ständigen Secretär A. Hirsch.* Zugleich mit den Berichten über die Fortschritte der Erdmessung in den einzelnen Ländern, während des letzten Jahres.—*Comptes-rendus des séances de la Commission Permanente de l'Association Géodésique Internationale réunie à Salzbourg du 17 au 23 Septembre 1888 rédigés par le Secrétaire perpétuel A. Hirsch.* Suivis des Rapports sur les travaux géodésiques, accomplis dans les différents pays en 1888. Berlin, G. Reimer, 1889: 4to., pp. 45, 44, and 104, maps, &c.

Irving, A.—*Chemical and Physical Studies in the Metamorphism of Rocks based on a Thesis (with Appendices) written for the Doctrate in Science in the University of London.* London, Longmans & Co., 1889: 8vo., pp. xi. and 137. Price 5s. [Presented by the Publishers.]

Reichenbach, O.—On some Properties of the Earth. London, Wertheimer, Lea, & Co., 1880: 8vo., pp. viii. and 376, plate.

[—] Supplements to "On some Properties of the Earth." 8vo., pp. 24.

[—] On Some of the Remarkable Features in the Evolution of the Earth. A Lecture. London, Wertheimer, Lea, & Co., 1884: 8vo., pp. 30.

[—] Colonel Clarke's Determination of the Excentricity of the Equator. Letter to Dr. A.—, March 1887: 8vo., pp. 15.

[—] Law in the Face of the Earth. 1889: 8vo., pp. 15.

Rhodes, Thomas.—1889-90. Rhodes' Steamship Guide and Holidays Afloat; a Complete Handbook of Coasting Trips and Ocean Voyages. With specially engraved Map of the World, showing the Commercial Flags of each Nation, the principal Steamship Routes, and the House Flags and Funnels of the Lines performing the different services. London, G. Philip & Son: 12mo., pp. 215. Price 2s. 6d. [Presented by the Publishers.]

Wisotzki, [Dr.] Emil.—Hauptfluss und Nebenfluss. Versuch einer begrifflichen Nachbildung derselben. Stettin, Léon Saunier, 1889: 8vo., pp. [vi] and 136. [Presented by the Author.]

This is one of those exhaustive memoirs on minute points for which Germans are unrivalled. The author rightly insists on precision of nomenclature in geography and frequently refers to and quotes the paper by Colonel Jackson, on Geographical Nomenclature in vol. iv. of the Society's Journal (1834). Dr. Wisotzki discusses in minute detail and with reference to many actual examples, what constitutes a main river and what a tributary. The conclusions he comes to are: 1. That the question between main river and tributary is not one of mere names, but is one of clear and accurate thinking; 2. The generally accepted features, e.g. length, volume of water, &c., are not sufficient to indicate the specific difference between a main river and a tributary; 3. The only distinctive characteristic is position, in its vertical and horizontal aspects, with special relation to the conditions as a whole of the region to which the river belongs; 4. Moreover, rivers which reach the sea directly are to be regarded as tributaries, whenever they possess characteristics of position similar to those of other tributaries belonging to the same system.

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Deutschen Reiches.—Karte des —. Scale 1:100,000 or 1·3 geographical miles to an inch. Herausgegeben vom Königl. Württ. Statistischen Landesamt 1888-9. Sheets: 606, Göttingen, and 618, Freudenstadt. Price 1s. 6d. (*Dulau.*)

Kaukasus.—Die Gruppe des Adai-Choch im Zentralen —. Nach topogr. Skizzen and fotogr. Aufnahmen Moriz von Déchy's, sowie nach der Russischen Generalstabskarte gezeichnet v. Dr. B. Hassenstein. Petermann's 'Geographische Mitteilungen,' Jahrgang 1889, Tafel 13. Justus Perthes, Gotha. (*Dulau.*)

Oesterreichisch-Ungarischen Monarchie.—Spezialkarte der —. Scale 1:75,000 or 1 geographical mile to an inch. K.k. militär-geographisches Institut, Wien. Sheets: Zone 28, Col. XVIII. Zepče; 28—XIX. Dubrava dl und Ribnica; 29—XVIII. Zenica und Vareš; 30—XX. Rogatica; 31—XVII. Jablanica und Podklečani; 31—XIX. Trnovo und Foča; 31—XX. Goražda und Čajnica. Price 1s. 4d. each sheet. (*Dulau.*)

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Witwatersrandt Gold Fields.—Troye's map of the —. With the latest information. Scale 1:86,400 or 1-2 geographical miles to an inch. Johannesburg, W. E. Burmester, June 1889.

This map shows the present state of the gold-mining industry of the Witwatersrandt. It is accompanied by a table in which the extent, position, and amount of capital invested are given. As the reefs on the Randt have only

been partially surveyed they are not shown on this map, but a glance at the table will show whether any company is on either of the three principal reefs, those on Main Reef having a red line before them, and Botha's and Black being indicated, respectively, by a blue or black line before the name of the company. The map itself is a very rough production, but serves well for the purpose for which it has been published.

AMERICA.

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Mexico.—Inundación de la Ciudad de Leon. Scale 1:10,000 or 7·3 inches to a geographical mile. México, Lit. del Timbre. (*Dulau.*)

— Inundación de la Ciudad de Lagos. México, Lit. del Timbre. (*Dulau.*)

Mexique.—États-Unis du —. Première partie par F. Bianconi et Louis de Balestrier. Paris, 1889. Cartes commerciales, avec notice descriptive. Ser. VII. No. 4, 4to, boards. Price 3s. 4d. (*Dulau.*)

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North America, west coast:—Cape Mendocino to Vancouver island. 793*a*, *b*. Malacca strait:—Pulo Penang to Parcelar hill (2 sheets). 794*a*, *b*. Malacca strait:—North and South sands (2 sheets). 795*a*, *b*. Malacca strait:—Cape Rachada to mount Formosa (2 sheets). 796. Malacca strait:—Mount Formosa to Tanjong Bolus. 2109. China sea:—Barram point to Nosong point. 1466. China, south coast:—Hong Kong. 2105. China, north coast:—Meiaco-Sima or Yaye-yama group. 2763. Coral sea, and Great Barrier reef. 214. South Pacific ocean:—Solomon islands.

(*J. D. Potter, Agent.*)

United States Charts.—No. 1159. Brito Harbor. West Coast of Nicaragua. From a survey in 1888 by Ensign W. J. Maxwell, U.S.N., and Civil Engineer J. F. Perez of the Nicaragua Canal Construction Company.—Pilot Chart of the North Atlantic Ocean. September 1889. Published at the Hydrographic Office, Navy Department, Washington, D.C. G. L. Dyer, Lieutenant U.S.N., Hydrographer.

ATLASES.

England and Wales.—The Modern County Atlas of —, comprised in fifty-seven maps, all on one scale, arranged alphabetically, with complete Index. W. & A. K. Johnston, Edinburgh and London, 1889. Price 12*s*. 6*d*.

The county maps which this atlas contains are taken from Johnston's Modern Map of England and Wales, and are drawn on the same scale, viz. 7 statute miles to an inch. In the atlas form they are more handy for reference than in the large four sheet map, the more so as the atlas is furnished with an index, by means of which the number of the required map and the position of any place on it can be found at once. All towns, and most of the villages and estates are shown, the railways have been brought up to date, the roads and canals are laid down. From its very handy size this atlas is well adapted for library or office use, and should also be of service to tourists and pedestrians.

Hachette et Cie.—Atlas de Géographie Moderne, édité par Hachette et Cie. Ouvrage contenant 64 Cartes en couleur, accompagnées d'une Texte Géographique, Statistique et Ethnographique, et un grand nombre de Cartes de Détail, Figures, Diagrammes, etc., par F. Schrader, F. Prudent et E. Anthonie. Paris, Librairie Hachette et Cie, 1889: 3^e Livraison. Price of each part, containing three maps and letterpress, 10*d*. (*Dulau.*)

The present issue of this atlas contains maps of the Asiatic Archipelago, Australia, and the Antilles, in addition to which are six pages of well-written letterpress, containing statistical information; an account of the physical features, illustrated by maps and diagrams, is also given. The letterpress referring to each map is printed on its reverse side, and by this arrangement each map is complete in itself. The map of the Asiatic Archipelago is nicely drawn, the mountain ranges, courses of rivers, and catchment basins being clearly shown. In the colouring of the ocean, the depths are indicated by different shades of blue. The most recent material appears to have been used in completing the map of Australia, which, as regards the physical features, is all that could be expected to be found on a map of its scale. Railroads have been brought up to date, the boundaries of the different colonies are shown, but the names of many important places do not appear. In the map of the Antilles the system adopted of colouring the ocean in different shades of blue to indicate the depth, previously mentioned, is adhered to. This map also contains Central America and portions of the republics of Mexico and Venezuela, as well as Southern Florida.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Geographical Co-ordinates in the Valley of the Upper Nile.

By E. G. RAVENSTEIN.

It is needless to dwell upon the importance of having a few stations in the interior of an imperfectly explored country, like Africa, whose positions shall have been determined by careful astronomical observations, so that they may serve as starting-points and checks for the explorer.

In the case of the Zambezi-Shire valley we are indebted for such a position to Mr. O'Neill, for Blantyre will be found to answer every object of a secondary meridian. Captain Speke has furnished geographers with a similar station in Unyanyembe; in the Niger-Benue basin we are well supplied with such stations as far as the British Admiralty surveys extend; whilst on the Congo excellent work in that direction has recently been done by Captain Rouvier and Mr. Baumann. Strange to say, we have no equally trustworthy information on the Upper Nile, although we have been longer familiar with it than with any other river in Africa, and it has exerted a fascination upon the geographical and philosophical sections of mankind far exceeding that of any other river whatsoever. Map-makers agree fairly well as to latitudes along the Upper Nile, but they differ widely as to longitudes. I have been compelled to consider this question repeatedly, as, for instance, when compiling the map of Eastern Equatorial Africa published by the Royal Geographical Society, and that showing the territories of the Imperial British East Africa Company, recently published by Messrs. Philip and Son. I am all the more induced to deal with this question on the present occasion as my friend Dr. Hassenstein, in his elaborate map of Dr. Junker's travels, has introduced positions which differ in some instances widely from those which I am about to bring forward, although the materials at his disposal were in all respects the same as those to which I myself had access.*

* Dr. Hassenstein's map, with memoir, will be found in Junker's 'Reisen in Zentralafrika,' published as a supplement to 'Petormann's Mittheilungen.' The result of Captain Watson's observations of the transit of Venus at Rejai, together with the sketch

It must for ever be matter for regret that many opportunities enjoyed by the Egyptian General Staff for doing excellent geographical work were not better availed of when the whole of the Nile valley was freely open to European explorers and surveyors. Nothing, for instance, would have been easier than to determine definitely the longitudes of Khartum, El Fasher, and of many other places telegraphically connected with the Observatory of Cairo. There were officers on that staff who were fully competent to do work of this kind, and I do not think I am unjust when I throw the blame upon its directors, who do not appear to me to have taken an intelligent view of the duties devolving upon them.

Although "Father Nile" is an "old" river in history—a proposition which would be scouted by geologists, who are bound to look upon it as a river still in its youth—our more accurate knowledge of its upper course is quite a recent affair. The astronomical observations made along it by some of its earliest explorers, such as Selim Agha and d'Arnaud, in the fourth decade of this 19th century, are utterly worthless.*

The first trustworthy observations on the Upper Nile were made in 1862, when John Petherick, and shortly afterwards Sir Samuel Baker, proceeded to Gondokoro, where Captains Speke and Grant were expected to arrive in the course of that year. It has been the fashion to underrate the value of Petherick's work, but if we examine a modern map of the regions of the Upper Nile, we shall find that he has not even at the present time been fully eclipsed by the explorers who succeeded him. Sir S. Baker's latitudes deserve our full confidence. Far more important were the observations made by Captain Speke, a born observer, during his descent of the river.

Lieutenant Julian Baker did much useful work during Sir Samuel's second expedition, in the course of which the Albert Nyanza was discovered. These explorers were succeeded, in 1874, by Captain Watson and Lieutenant Chippendall, of the Royal Engineers, and in 1877 by Colonel Mason and Major Prout, of the Egyptian General Staff. As I propose to deal only with positions determined along the course of the Nile, I merely mention the names of Heuglin, Marno, Rev. C. W. Pearson, Lupton, and Emin Pasha, as those of explorers who made observations in the Nile region, though not on the Nile itself.†

Notwithstanding the large number of observers, the number of places

of the country around Gondokoro, which accompanies this paper, were communicated by me to Dr. Hassenstein, but he seems to have misunderstood the import of my communication (see his 'Memoir,' p. 90).

* Selim places Gondokoro (Chanker Island) $4^{\circ} 35' \text{ N.}$, $32^{\circ} 20' \text{ E.}$; d'Arnaud, $4^{\circ} 43' \text{ N.}$, $31^{\circ} 38' \text{ E.}$, the true position being $4^{\circ} 54' \text{ N.}$, $31^{\circ} 48' \text{ E.}$ The near approach to the true longitude is of course a mere accident, for observers who are from ten to twenty miles out in their latitudes are not likely to find out the longitude within ten miles.

† Dr. Hassenstein in the 'Memoir' referred to above, furnishes full bibliographical information on these observations.

whose longitude has been determined by absolute observations is very small. They are Khartum, Taufikiya (Lieut. Baker), Abu Kuka or Lolnun (Petherick), Gondokoro, Rejaf, and Magungo, and of these Taufikiya and Abu Kuka need not be considered with reference to the present inquiry.

Beginning with Khartum we have the following results:—

Observer.	Lat. N.			Long. E.		
	°	'	"	°	'	"
Cailliand and Letorzec, 1821 ..	15	37	10	32	37	0
Kinzelbach, 1862	15	36	36	32	39	30 (8 lunars)
J. Petherick, 1862	15	37	28	32	28	42 (6 ")
Lieut. de Bizemont, 1870 ..	15	37	20	32	37	2 (31 ")
A. Lucas	15	37	36	32	25	57 (2 ")
Col. Prout, 1877	15	37	4	32	53	39 (22 ")

Letorzec was an astronomer by profession, and Lieut. de Bizemont is a naval officer, specially placed on General Gordon's staff on account of his qualifications as an astronomical observer. If there were no other observations extant I should, without the least hesitation, place Khartum in long. 32° 37' E. Colonel Prout, also an excellent observer, takes care to state that he was unable to determine the permanent error of his sextant, and we should, therefore, be justified in rejecting the result. Fortunately, the extensive railway surveys, carried on under the direction of Sir John Fowler, enable us to check the longitude of Khartum. These English engineers determined the position of El Fasher in Dar-Fur by a series of most careful observations, and connected this place by a traverse survey with Dongola and Khartum. As all distances were chained, and the angles measured with a theodolite, the result ought to be free from gross errors. Placing El Fasher in 13° 36' 45" N. and 25° 22' 34" E., the position of Khartum would be long. 32° 46' 30" E.*

From Khartum I at once proceed to Gondokoro and Rejaf, the relative positions of which were determined by Captain Watson by compass-survey and chronometric observations (see map on p. 645). The results (for Gondokoro) are as follows:—

Observer.	Lat. N.			Long. E.		
	°	'	"	°	'	"
J. Petherick	4	53	0	32	12	24 (2 lunars)
Lieut. Julian Baker	4	54	45	31	28	8 (2 ")
J. H. Speke	4	54	5	31	46	9 (5 ")
Capt. Watson	4	54	28	31	7	23 (2 ")
Do. (deduced from obs. at Rejaf)	..	..	..	31	1	57 (9 ")

* Colonel Mason's longitude of El Fasher, determined independently of the English engineers, is 25° 23' 45" E.; Colonel Prout's, 25° 24' 6" E. For information on Sir John Fowler's engineers, see Ensor, 'Incidents of a Journey,' London 1881.

Taking the mean of these, and giving equal weight to each set of observations, the resultant longitude of Gondokoro would be $31^{\circ} 21' 48''$ E.

At Rejaf, on December 8th, 1874, Captain Watson was fortunate enough to observe a transit of Venus. The longitude calculated from this observation is $31^{\circ} 44' 17''$ E., and that of Gondokoro consequently $31^{\circ} 48' 39''$, a result all the more satisfactory, as it differs only to the extent of $2' 30''$ from the mean of the five sets of lunars observed by Captain Speke.

The only other place whose longitude has been determined by absolute observations is Magungo on the Albert Nyanza, which Colonel Mason places in $2^{\circ} 14' 42''$ N., $31^{\circ} 31' 45''$ E., the longitude being dependent upon four eclipses of Jupiter's satellites.

In addition to these absolute determinations we are indebted to Lieut. J. Baker, Captain Watson, and Colonel Mason, for a considerable number of chronometric determinations, which enable us to connect Khartum with Magungo.

If we combine the chronometric determinations of Lieut. Baker and Captain Watson, we shall find that Khartum lies $56' 21''$ to the E. of Gondokoro, and accepting Captain Watson's observations at the Rejaf station, Khartum would thus lie in long. $32^{\circ} 45'$ E. of Greenwich, which differs only to the extent of $1' 30''$ from the position assigned to that place by Sir J. Fowler's surveyors. For the present, at all events, I am inclined to abide by that longitude, though sensible of the fact that further observations are called for before it can be accepted as final.

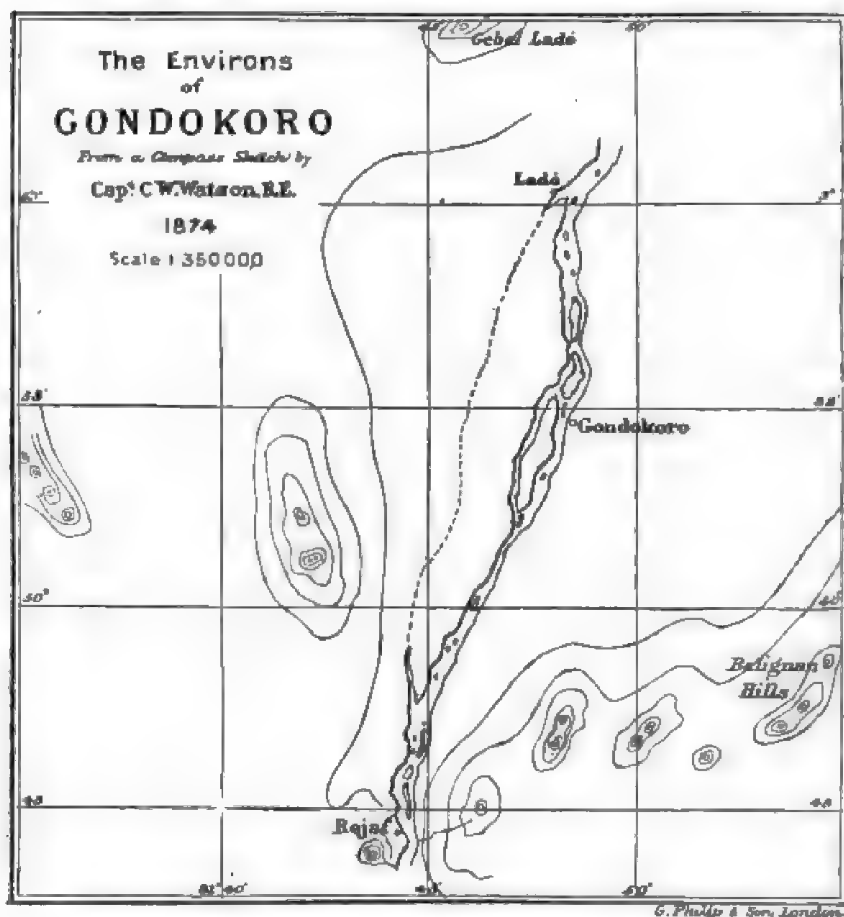
We obtain thus the following positions along the Nile, between Khartum and Rejaf station:—

	Lat. N.			Long. E.			
	°	'	"	°	'	"	
Khartum	15	37	20	32	45	00	{ Dependent upon Capt. Watson's Rejaf. Lieut. Baker.
Fashoda	9	54	20	32	24	0	
Taufikiya	9	25	54	31	53	15	{ " " " Capt. Watson. Sir S. Baker.]
Sobat mouth	9	23	50	31	45	29	
[Bahr el Ghazal mouth ..	9	29	0	30	39	24?	{ Capt. Watson. Capt. Watson.
Shumba	7	5	59	30	55	25	
Holy Cross	6	46	23	31	16	7	{ " " " "
Bär	6	12	41	31	43	38	
Gondokoro	4	54	20	31	48	39	{ " " " "
Rejaf station	4	44	32	31	44	17	

* In longitude $31^{\circ} 44' 13''$ E., according to seven sets of lunars observed by Lieut. Baker.

My next task will be to connect Colonel Mason's series of observations with the above. Ladó, on Captain Watson's map, lies in long. $31^{\circ} 48' 23''$ E. or $4' 6''$ E. of Rejaf station, and as the chronometric

difference between Ladó and Magungo (according to Colonel Mason) amounts to 17' 51", Magungo, referred to Captain Watson's Rejaf, would lie in long. $31^{\circ} 30' 32''$ E., which only differs to the extent of 1' 13" from the position assigned to that place by Colonel Mason himself. This observer states that Jebel Rejaf bears $200^{\circ} 30'$ from Ladó, but compass bearings of this kind are scarcely ever very accurate, and as



the variation of the compass on the Upper Nile is only known approximately, we prefer to trust to Captain Watson's sketch-map rather than to this isolated observation. On Captain Watson's map the true bearing is 196° , the variation would thus amount to 4° , whilst in reality it probably approximates 8° .*

* On Dr. Junker's map the bearing is 200° , no correction for variation having been applied.

If now we refer Colonel Mason's chronometric differences to Captain Watson's Rejaf, we obtain the following results:—

	Lat. N.			Long. E.		
	°	'	"	°	'	"
Ladó	5	1	12	31	48	23
Beden	4	35	48	31	34	56
Kiri	4	18	10	31	39	15
Labore	3	55	42	31	50	11
Dufli	3	34	55	32	1	32
Magungo	2	14	22	31	30	32
Kavali	1	22	20	30	30	10

I am quite willing to admit that the above results can in no way be looked upon as final, but the agreement between them, whether due to a happy accident or to the skill of the observers, is very remarkable. For the present, at all events, these positions cannot arbitrarily be shifted to the east or west, as appears to have been done by Dr. Hassenstein, who places Gondokoro 6' 27", Ladó 4' 11", and Rejaf 5' 41" further west than I have done, whilst moving Dufli 2' 58" to the east of the meridian adopted by me in the above list. It is obvious, too, that any so-called trigonometrical operations, which are dependent upon positions thus arbitrarily shifted, must be vitiated at their very fountain-heads. I have the very highest opinion of the excellent work done in the regions of the Upper Nile, by painstaking explorers like Schweinfurth, Junker, and Emin Pasha, and for Dr. Hassenstein's conscientious labour in placing the results achieved by them before us, but before we shall be at all in a position to give a satisfactory delineation of these compass and itinerary surveys it is absolutely necessary that we should be furnished with a small number of points, the geographical co-ordinates of which have been determined by trustworthy observations.

Wind-action in Egypt.

By W. M. FLINDERS PETRIE.*

EGYPT is an especially favourable country for studying certain causes of geographical and geological change. The absence of all effective vegetation above the Nile level, enables any one to see the surface conditions at a glance. The absence of rain, except in occasional storms, leaves the wind-action in remarkable prominence, and allows us also to see the effects of a different climate, now long past. And the presence of dated monuments throughout the country, extending farther back in history than any other series of man's works, gives

* Read to the Geographical Section of the British Association, Newcastle, Sept. 1889.

more precision to estimates of time than can be obtained elsewhere. Though my own work has been among the historical remains, yet many geological evidences have come before me, to which I wish to draw attention in hopes that some thorough examination of so valuable a district may be made.

The Isthmus of Suez is an important tract both for the geographical and biological questions of the connection of that sea with the Mediterranean, and also for the various events connected with that region. But the evidences of change there are more complicated than we might suppose; upheaval, depression, and denudation all coming into play. That the Delta as a whole is sinking, and sinking at about the rate at which the Nile deposits are being piled upon it, seems certain. At Naukratis, on the west side of the Delta, the rise of land by deposits has been $4\frac{1}{2}$ inches per century; and at Tanis on the east side, and nearer to the coast, the water-level as shown by a well there has risen $4\frac{1}{2}$ inches per century, though the country is now barely above the sea. At Ismailiyeh in the middle of the Isthmus of Suez, the land has, on the contrary, risen. The present lake there is necessarily on the sea-level, as the canal opens into it; and 10 or 15 feet above the water may be seen a line of thin fragile shells which seem probably to have been formed near the water surface, and which cannot have been exposed for long ages, to judge by their condition. The same late date of this elevation is also shown by the pottery of a Roman village stopping short at the level of the shells, and not extending down to the present water. The position of this site is W.N.W. of Tusun, at the spot marked *Ru.* in the War Office map. The elevation of this region accords with the historical evidence of the head of the Red Sea having extended up to Ismailiyeh; as, when it was 15 feet lower, the submerged region would have been much larger than at present.

These changes of level are, however, but a part of the modifying forces. The wind-action, which is so strikingly seen in this region, is probably quite as powerful a cause of changes as the elevation of the land. The most visible signs of such a force are seen on the western side of Lake Ismailiyeh. Here a high sand-dune forms the limit of the lake, sloping down into it at the angle of rest, and often obliging the traveller to walk in the water in order to pass the foot of the slope. At such points as this it is evident that the lake must be rapidly filled up and modified. But the historical evidence shows that the whole hills have been swept away from the surrounding country in the last two thousand years. The Greek camp of Daphnæ, about 12 miles from Kantara on the Suez Canal, and bordering on the marshes of Lake Menzaleh of the Mediterranean coast, was surrounded by a wall of crude brick about 40 feet thick, and over a mile in circuit. In proportion to the thickness, and to other such Egyptian town-walls, the height was certainly 30 feet, and probably more. Yet the whole of this mass

of hard mud brick has been so utterly swept away by the wind that only the buried foundation remains. Rain has had no share in the actual removal of the clay, as there is no wash from the wall upon the ground on either side. The whole mass, at least 40 feet by 30 in section, has been carried away and deposited elsewhere by the wind alone.

The above is not an isolated case. Some 15 miles to the west is the ancient cemetery of Tell Nebesheh. The tombs have been built of mud brick in a large rise of sandy ground, such as is often seen in the mud flats of the Delta. These tombs were subterranean chambers about six feet high, with well-shafts leading to them. But only two or three now exist entire, sufficient to explain the remains of the others. In most cases the chamber has been nearly removed by the wind-denudation of the whole hill. This shows that about eight feet, or more, of soil has been carried away in 2600 years, or nearly four inches per century. The wall of crude brick around the temple at Tell Nebesheh, though 30 to 40 feet thick, has been swept away by the wind like the wall of Daphnæ, down to the ground-level.

The question naturally arises, where has all the material thus removed been deposited? In a continuous desert the sand-dunes may march on slowly for years, and the furious sand-storms drop their burdens only to be picked up again in the next gale. But in a district intersected by marshes and lakes there is a perpetual trap for all loose material, and whatever touches the wet surface never rises again. Hence all the water will be continually rendered shallower by constant filling up in high winds, and great extents of sandy marsh and very shallow lakes will be formed. This is precisely what we find the most prominent feature of all this region.

Subtracting then the effects of the causes which we have seen to be at work, the deposit of the Nile, the changes of level of land, and the denudation by the wind, we may form some idea of what the appearance of the district must have been some few thousand years ago, when the earliest monuments of human occupation were erected. At that time the eastern side of the Delta must have been more like a part of the neighbouring desert, with hills about 30 or 40 feet high; the Nile flowing down between them, and spreading out into the side valleys, depositing the Nile mud as a level bottom across the valleys. Gradually the deposits rose, the wind ploughed down the hills, and laid the material in the water around, until at present we only see the tops of the denuded hills just appearing as patches and ridges of sand amid an expanse of mud. Meanwhile the coast sank, and the large region of Menzaleh was in Arab times inundated by the sea, and lost to cultivation. The Isthmus at the same time was rising; until, by the general elevation, and the masses of sand blown into the water, the head of the Red Sea was broken up and formed only a chain of half-choked saline lakes,

through which the Suez Canal now runs. But whether we turn to the north coast or to the Isthmus, we see that the wind-action is probably a cause of change of equal power with the deposits of the Nile or the variations of level of the land.

So far we have only reviewed the changes of the historical period; but up the Nile valley are some of the most brilliant evidences of the enormous climatic differences which rendered the country in the prehistoric human period wholly different from what it now is. That the land was lower, and that the Nile ran into a long estuary, in prehistoric times is usually granted. But there is also no question that a great rainfall over all the country swelled the volume of the river, so that it far exceeded the present stream of even the inundation. The problems yet to be solved are, what was the limit of salt water, and the limits of river and estuary? What was the volume of the Nile? and what was the date in chronology and in civilisation when the present state of the country was established? As illustrations in point I would instance the following examples. The enormous rainfall of the Nile valley is shown by the cliffs at Thebes. There a narrow ridge of limestone, a sort of wall, separates the vertical cliffs at Deir el Bahri from the equal precipices at the head of the Valley of the Tombs of the Kings. This ridge cannot possibly have received surface flow from either end—nor, being limited by cliffs on either side—can more than the catchment of a few hundred feet in width have ever poured over the edges of this dividing wall. Yet the hard limestone is grooved out into a row of wide pipe-shaped grooves down either face, the breadth and close order of which show the volume of rain which must have poured down them. The same story is shown equally plainly in the watercourses which cut up the Nile cliffs into a fringe of ridges divided by deep ravines. These ravines are often a couple of miles in length, and a quarter of a mile in width, cut down through two or three hundred feet depth of rock by a waterfall, of which the evidence remains in the precipitous head of the ravine, the polished rock surfaces over which the cascade has poured, and the deep cauldron scooped out by the descending stream. Yet the catchment basins of such eroding forces are sometimes not over a few square miles in area.

That such erosion took place during the period of the high level of water in the valley, be it fluvial or estuarine, is shown by the height reached by the great banks of debris washed out of the ravines, and piled up as a foreshore to the cliffs next below those torrential valleys. This is very finely seen at Beni Hasan. And it seems most probable that the celebrated wash-beds at Thebes, in which General Pitt Rivers—and later myself—have found wrought flints, were also deposited beneath the water, by the torrent from the Valley of the Kings' Tombs. It seems improbable to suppose a subaerial stream spreading out its material in such a wide fan; rather we see, both here and at Beni Hasan, how

a subaerial stream will, on the contrary, cut through such broad beds of subaqueous deposit by deep subsequent ploughings. That the age of the high water was within the human period, and that therefore the Theban beds might be subaqueous, is proved by the river-worn palæolith of characteristic appearance, which I picked up hundreds of feet above the present Nile on the desert cliffs of Eaneh.

I have now briefly shown what an interesting ground for research still awaits the geographer and geologist in Egypt; and how the conditions of the country render certain problems far more simple than they are in lands with continuous rainfall. Let us hope that our present facilities in Egypt may bring about some complete study of the subjects on which we have now touched.

*An Expedition across Australia from South to North, between the
Telegraph Line and the Queensland Boundary, in 1885-6.*

By DAVID LINDSAY, F.R.G.S.

Map, p. 704.

THE following is an account, slightly abridged, of Mr. David Lindsay's interesting journey across Australia, undertaken at his own risk and expense, in 1885-6, in which he passed through a large tract of previously unexplored country in the Northern Territory of South Australia, a little west of the Queensland boundary. This experienced pioneer and surveyor in the Australian wilds has since, between September 1887 and March 1888, crossed the continent a second time, from Port Darwin to Adelaide, accompanied only by a native boy, and taking four horses as baggage animals. The first journey was undertaken with camels, partly hired and partly supplied by the well-known promoter of Australian exploration, Sir Thomas Elder.

Exploration of the Finke River.—In November 1885, I left Dalhousie with my companions, Lieutenant Dittrich and Warman, and six camels, and proceeded to explore the Finke River.

From Dalhousie I sent down a collection of plants to be forwarded to Baron von Mueller for classification. In this collection, as well as in all others subsequently sent, were as far as possible three specimens of each plant, so that one complete set could be kept by the Baron, one by the Geographical Society of Melbourne, and the third for Lieutenant Dittrich and myself to dispose of as we might think fit. A box of photographs was also sent, together with native weapons, seeds, and other interesting articles. As much information as possible about the language, manners, and customs of the natives was obtained, and put together in a report by Lieutenant Dittrich.

We followed the Finke from a water-hole known as Muckarrina, and for a few miles it was a broad flooded valley, beautifully timbered and grassed, having sandhills on both sides, the tableland having ended at Muckarrina; suddenly the valley narrowed to a mere hollow between the sandhills with a few box-trees here

and there. It was with the greatest difficulty that the course of the water could be traced, but there is no doubt that the course marked out on my map is absolutely correct, and that the water joins Spring Creek Water, which creek drains the tableland that surrounds the Dalhousie Springs and carries off the superfluous waters which in winter-time flow from those magnificent springs.

Spring Creek in floods spreads over a valley from one to three miles wide, and then for a considerable distance flows in many channels through sandhills forming some fine water-holes, the principal one being Maithinkinna. Proceeding a little farther some large flooded flats were found, all well clothed with many good bushes and grasses. Following what appeared to us to be the main channel, with clear evidence of the flow of water in that direction, at a point a few miles below Maithinkinna we met with distinct evidences of water flowing in the opposite direction; this was puzzling to us, still we went on down the valley and watercourse until we emerged on the flooded plains of the Macumba. We satisfied ourselves that there could be no doubt that the flood waters of the Macumba pass up the valley we had followed and join the Finke waters, backing them on the flooded flats near Maithinkinna. Returning to the water-hole, I went away alone to see if there was any other outlet for these waters, and discovered a creek or watercourse leading through a flooded flat, with some watercourses coming in from the north, which we afterwards found came from the Finke. I followed this flat for about ten miles and came to a fair waterhole called Goodoweedalgina, with an extensive plain stretching away to the south-east, high sandhills on both sides. I then returned to camp and found some natives had come in. From them I ascertained that the word "Tirreawat" supposed by Messrs. Jarvois, Knuckey, and others to be the name of a large water on which Leichhardt and party had been destroyed by the natives, was a word which had fallen into disuse, and simply meant "a very long way."

Next day Lieutenant Dittrich and I, taking a native as a guide to some waters, returned on my tracks to Goodoweedalgina; from there the boy took us across the extensive plains I had seen the previous day to a good water-hole, named Ilkertinna, on the south side of the plains and just in the sandhills. The boy said this was Macumba water. From here we travelled easterly all day down the plain, which was well bushed, grassed, and timbered, passing some nice water-holes, until we again found ourselves on the Macumba Plains and could trace by the drift-wood the course of the Macumba waters on to the plain. The blackboy said that the flood waters of the Macumba and Finke met and filled these flats and plains and then ran down on the Macumba to Lake Eyre. After a three weeks' absence we returned to Dalhousie, in time to share in some Christmas festivities, having satisfactorily settled the much disputed question as to the debouchment of the Finke river, and having also proved that no such water as Tirreawat existed; therefore the supposition that poor Leichhardt perished in this vicinity has no foundation, but it is evident that the natives of this locality heard of his death having taken place to the north-east.

Excursion to the Western Boundary of Queensland.—After a week at Dalhousie I started, accompanied by Mr. C. Bagot, on a journey easterly to the Queensland frontier. I was sorry that I could not take Lieutenant Dittrich with me, but my reasons for not doing so were these:—The weather was extremely hot, and there would certainly be sixty miles of heavy sandhill and spinifex country to cross before reaching Murraburt, consequently I wished to travel as light as possible and not be bothered with pack-camels; my intention being to go alone, taking only one guide to Murraburt and other native wells in that country. There was only one blackboy at Dalhousie who knew the way, and him I could not get unless I also took his master, Mr. C. Bagot. The Beltana camels were both unfit for the journey,

and as my own riding camel was invalided with cut feet, I had no mount to give the Lieutenant; besides, had there been four of us we must have taken a pack-camel, and I wished to have as many of my camels as possible in good condition for the arduous journey which was before us ere we could reach Lake Nash.

I need not give a detailed account of the journey to and from the Queensland boundary, which occupied three weeks and covered 419 miles.

Murraburt was a disappointment, for, judging by what the natives had said, it was confidently expected that a large water existed there. I have very little doubt that Murraburt is a spring, as the well is not in or near a watercourse and is sunk through hard ground, perpendicular for twelve feet and then sloping almost flat for eight feet to where the water bubbles up. The water is slightly bitter and very clear, but pleasant to the taste; rotten limestone abounds, and the valley or plain abounds with salt-bush, blue-bush, cotton-bush, and good grass, and is indeed what, with a good water supply, would be termed first class sheep country. Our boy guided us to eight other wells, all in good plains or valleys, before we reached the boundary line in lat. $25^{\circ} 40' S$. We returned by much the same route, as we could hear of no wells further to the north. We met with no new plants or trees, save a cork-bark tree, a specimen of which was taken. The natives have the same customs as those of Dalhousie. They had no tradition of white men, and we found no marks of white men. A certain hill on the shores of Lake Mirampompom, our guide pointed out and said, "Long time ago, blackfellow all about sit down, tonga that one, big fellow corroboree," when one day the blacks came down from there (pointing north), and after a terrible battle all the local natives were slain, and the enemy returned to the sandy desert whence they came.

All the wells we found are, I believe, springs, and should that be the case, then a considerable tract of available sheep country was discovered by us in the heart of what was supposed to be a barren sandy desert.

From Dalhousie to the Gulf of Carpentaria.—After a week's spell at Dalhousie, occupied by me in preparing maps and reports on the country we had explored, for the Government, and by the party in preparing for the journey to Lake Nash, my men and animals started along a track leading northerly to a well, Nerring Nerringers, on the Finke, some 40 miles distant from where I purposed making the start for Lake Nash. All the camels were looking well, the poor ones being in good condition, and the tender-footed ones, except one, having put on new soles. I went first to Charlotte Waters and thence proceeded down the Finke to join the party. I reached the camp at midday on 2nd February, 1886, and found that after clearing out the well a good supply of really good water had been obtained.

From this point I will give extracts from my journal, and a full detail map of the whole of the explorations.

On the 3rd February, at 1.20 p.m., we made our first start, having eleven camels all well loaded, as we had over two months' rations and 120 gallons of water, besides other impediments, the average weight on each pack-camel being about 450 lbs., while the riding camels carried two men. Of course I rode alone, and carried a swag and eight gallons of water. I had been unable to get a black boy for the Lieutenant. Mr. Glyde rode with him. The day was hot. My intention was to follow a north-easterly direction, so as to cut the course of the Todd which I intended then to run up, hoping to find a water, named Ipperdoornina, which is said to exist somewhere on the Todd, about 100 miles distant, failing which water we would follow up the Todd and the Giles to where I was assured I could depend on finding water in a large hole, or by sinking a few feet. This would be about 150 miles distant. I anticipated no difficulty in getting through, judging that at the worst the camels would go five days, and then if I did not find Ipperdoornina I could leave the loading and travel

by night to the Giles. We went on an allowance of one gallon of water per man per diem, thus giving us eight days' water for ourselves, and some 50 gallons for any of the camels which might require it.

To avoid some stony hills, about five miles distant, we travelled north, when after entering the sandhills which have a course of north-west and south-east, we camped at 6.55 p.m. on the best feed we had seen for several miles. The camels did not eat much.

4th February.—Got an early start and travelled on courses varying 20° to 350° to take advantage of the best travelling. All the sandhills were clothed with spinifex and the weather was very hot. Camped an hour for lunch, and onward again over some sandhills which are clothed with spinifex and thorns and produce no camel-feed. We travelled until 8 p.m. without finding any feed to camp on. The party were all walking by turns to ease the camels.

5th.—Made an early start, and at 10.15 a.m. came on some feed, *garakulya*, rather dry, where we unpacked and turned out. We started again at 12.30 as the camels would eat no more. The two Beltana animals had shown signs of fatigue in the morning, and for the next few miles kept lying down. At 3.40 p.m. the cow camel would travel no further. We unpacked again, and after considering the matter in all its bearings decided to give the camels all the water we could, and return to Nerring Nerringra, for with one camel knocked up on the third day, how many might there be on the fourth or fifth? I knew that at least five of my own animals would have gone through easily enough, for they had been tried, but of the others we knew nothing. Accordingly, at 8.30 p.m., with the greatest reluctance, we commenced to retrace our steps, travelling until midnight. The weather was certainly very hot; one dog succumbed to the heat although he was riding in a shade all day.

6th.—Travelled down the valleys between the sandhills, the cow camel carrying scarcely anything save the bare saddle. Camped at 3 p.m. in fair feed.

7th (Sunday).—Travelled back on our tracks the whole day, the camels going very well; reached the well at 11 p.m. Watered the camels.

8th and 9th.—Spelled the camels. Nice cool days. South-east wind.

10th.—Having failed to get across the sandy desert in the direction I first intended, I determined to follow up the Finke to near the Hugh, and then strike across to the Todd. We left Nerring Nerringra after dinner, and travelled till 6.50 p.m. Sudden change in the weather; cloudy, and strong south-east wind.

Our short journey into the sandhills was rather disastrous, as Warman's swag was lost during the night, Mr. Leech's rifle was broken through a camel rolling on it, I lost my bunch of keys, and consequently had to burst open all my boxes. The box carrying my sextant, artificial horizon, &c., had a fall and broke the mercury-bottle, letting half of the mercury escape; fortunately none of it got into the sextant-box. The sextant-box was thrown out of adjustment, but was not otherwise hurt.

11th.—Cool night; cool, cloudy morning; strong south-east wind. At 8 a.m., thermometer 80° ; aneroid 29.18. Travelled up the Finke valley through good timber, principally Eucalypti. Sandhills to the north; low stony sandhills and tableland to the south. Found some good water-holes in fine clay soil. Magnificent grass and herbs.

12th.—Cool night. At 8 a.m., thermometer 82° ; aneroid 29.66. Travelled 22½ miles up the valley of the Finke, still in same good country, large white sandbed. Fine gum-trees.

13th.—Still travelling up the Finke. Passed native wurleys and wells, saw some natives; the creek bed narrows from half a mile to five chains; splendid timber

on banks, gum, acacia, &c. Open undulating country to south-west, high sandhills to north-east. Camped on the Goyder on most excellent feed.

14th (Sunday).—Followed up the Goyder, and camped at the scoop-holes at the road-crossing, at 11.10. The permanent water in the sand is about two feet from the surface. Good country, sandy. Fine gum-trees, mulga and acacia. Some low stony hills.

15th.—Started up the road at 7.40. In eight miles could see a fine range about 20 or 30 miles to the north. Until we struck the Finke at midday the country was sandy, with mulga-covered stony hills intervening and very good grass. Travelling along the Finke was very pleasant. In and out the track winds amongst large shady Eucalypti, crossing the creek occasionally. Cliffs on west bank, and high red sandhills on east. The bed is of white sand, and, judging by the green rushes growing, I think water would be obtained at shallow depths almost anywhere. Camped at Crown Point, and photographed it.

16th.—The night was very cold. At 6.30 a.m., thermometer, 56°; at noon, 100° in shade. Following the track, sandhills trend N.W. by W. We camped at Horseshoe Bend after dark. The well to which we had been directed was choked with the rotting carcase of a bullock; obtained water in a soakage hole a few yards away.

17th.—Travelled up the bed of the Finke, passing (on the east bank) under some very high cliffs showing different coloured horizontal strata of clay or soft stone; some thin streaks of blue clay between red and grey stone. The weather was muggy and cloudy. Passed Engoordina station, and still followed the Finke; same description of timber and country. Numerous wells are being sunk, all giving good water at from 4 to 10 feet; going deeper, brackish water is met with. Some water-holes in the bed of the creek. Prepared for rain, but were again disappointed.

18th.—Cloudy, sky very rainy looking, cool north-east wind. Still following the Finke, crossing and recrossing to shorten the distance—the river course is very tortuous. We passed a salt water-hole in the river-bed, with a perfectly fresh-water well about 10 yards from it. All day we had been looking for a good water-hole from which to make another start over the sandhills. Although we passed several wells, the water was too much polluted by the cattle. About one mile from Depot Hill, we found a scooped hole, very deep, in a watercourse at its junction with the Finke, under rock cliffs. We pitched tents and fires and prepared for rain. Fine gum trees, and good acacias.

19th.—Camels resting. Only a few drops of rain fell last night. The morning was dull, cloudy, sultry, and looking much like rain. Wind north-east, thunderstorms hanging about.

Mr. Glyde and I walked about four miles to a high tableland from which we hoped to see Chambers' Pillar distant only 16 miles. We were rewarded for our trouble by having a perfectly distinct view, through our glasses, of that wonderful natural monument.

20th.—Filled our water-vessels (108 gallons) and started for the Todd at 1.40 p.m. intending to reach Lake Nash as quickly as possible. We reached the Hugh at 7 p.m., having travelled over a jumble of sandhills covered with spinifex, desert oak, various bushes, and Parakeelya. Strong south-east wind all day.

21st.—Crossed the Hugh, road, and telegraph line about 1½ miles above Alice Well, and made 21 miles over low sandhills with high range ahead; the vegetation was spinifex, desert oak, Parakeelya, and low bushes. The sandhills were not at all regular; it is evident that we were crossing near their northern extremity in this direction.

22nd.—Travelled in a general direction 26° over low sandhills and low stony

hills with fine bold ranges in sight. After lunch we passed through some low stony hills with very broken rocky range on our right with good mulga country at foot.

23rd.—For the first six miles our route lay over low jumbly sandhills; an isolated hill, 350 feet high, was on our course. I climbed it, and had an extensive view; sketched in the surrounding country from it. Noon found us at the foot of a high and very precipitous range. I climbed a hill 650 feet high, guarding a pass through which we easily travelled, and found a fine level strip of country lying between this and another dark range, and extending in the direction in which we wished to travel. Gum watercourses came out of these ranges, but I was unable to find any water. We saw some old native encampments; the thermometer marked 102° in the shade.

24th.—Hot and sultry. Travelled along the south-east foot of the bold range, on the face of which were eleven distinct walls of rock. The height of the range must be 1000 feet above the level of the plain. Low sandhills stretching away to our right, with some table-topped hills 30 miles distant. Very oppressive day. We struck the Todd at 4.40 p.m., and followed it up for one mile before we camped; pretty fair feed. The camels are feeling the hot weather, especially as they have not had good feed on the way.

25th.—Very hot and oppressive morning. The bed of the creek was dry, and all the timber looked parched. Our guide reported fresh native tracks down the creek, but on going to examine them I found that they were about two weeks old, and useless to us. This is the fifth day the camels have been without water, and every day has been very hot, consequently the camels are showing signs of fatigue. Started for the water-hole on the Giles. At noon found it too hot for the camels to travel, and therefore turned out. Poor Joorak had a sunstroke, and was very ill for a day or two after. Applied the usual remedies, and he was able to travel that night on a pack-camel. The poor fellow thought he was going to die, and gave us directions how to bury him. The lieutenant was also very faint, and I had to administer some brandy to him. Left all our stores, goods, and instruments, and at sundown resumed our journey with a week's water and rations.

About midnight I saw a small fire in the bed of the creek, and thought it was a native camp, but was disappointed to find it only a burning stump. Travelled the whole night and camped at 6.15 a.m. on the 26th; turned the camels out to have some feed before the sun became too strong; had breakfast, and at 8.40 a.m. I started to look for water, following up the valley of the Giles for three miles, when a very dry, stony creek came in from the left—certainly not an attractive looking creek for water, but Providence guided me and I turned up it; in a quarter of a mile I came on a pad with emu, kangaroo, and dingo tracks fresh on it, and heard the screeching of black cockatoos; passed through a gap, and in half a mile came to a small clay hole containing a little water, and quite sufficient for us for a few days. I hastened down the plain in which this hole is situated, and climbed a hill opposite the camp. Cooeed to the party and they answered me. I shouted directions and saw some movements among the men, so concluded that they understood me, and went back to the waterhole and waited impatiently until 1.45 p.m., when I rode back for them. They had not started; they had heard me calling out, but thought it was natives. Before sundown had the camels all watered; they did not seem so impatient to get the water as I expected. Joorak was again ill, and Lieut. Dittrich very much fatigued.

When we were settled in camp we heard a native's cooey, and having answered it, two men came down from the hills. I had made a signal smoke in the morning just above camp, hoping to attract the attention of any natives who might be in the vicinity. It appears I was successful, for one of these

ellows had seen the smoke and made across to it. From the top of a hill overlooking the camp he had seen the party, and, as he expressively put it, "Me sing out, sing out, stupidly beggars no hear'um." (The fellows were all tired, having travelled all night.) He then came down to the water-hole for a drink and saw my blanket and water-kegs, which I had left under a tree when I went back to camp. He then went away to another native and told him, "White fellows sit down." Later on their numbers were increased by the addition of one old man, one young man, two old lubras, three young lubras, and three piccaninnies, twelve in all. These natives informed me that the water for which I had been making, had "All about tumbled down, too much hot," and that this was the only water about; promised to guide me to a water to the north-east and told me, "Too much hot, waters all about tumble down, can't walk," the way I intended going.

27th.—After dinner Glyde, Durack, and Warman with seven camels went back for the goods.

28th (*Sunday*).—Cool and cloudy. After dinner we went down the Und-wund-wa. We did this to save the pack camels nine miles travelling.

Monday, 1st March.—In camp for watering the caravan, which we allowed to pass us at about 2 o'clock; one of the blackfellows saw the tracks and ran off, reaching the water just as the camels were watered. Packed up and reached our camp at sundown. Mr. Glyde described the gorge through which we passed during the night as very grand and beautiful when seen in daylight.

2nd.—Hot, clear, afterwards cloudy. The two natives, who had undertaken to guide us to certain waters and through the ranges, led us through very rough gorges to Und-wund-wa, where I shot two emus. To the astonishment of the natives there was but little water, and that unfit to drink. This quite upset the Lieutenant's confidence in our guides, and for the remainder of the way to Illinga he made poor Glyde miserable with his forebodings that we should get no water.

At 2 p.m. we entered a gorge, and there, beneath a frowning mountain 700 feet high, we found permanent springs, surrounded by reeds and bulrushes, excellent water in the sand and also in a black mound. There was also fair feed for the camels, and here we camped. From the top of this rock mountain, which was so precipitous that I could have thrown a stone right across the gorge to the opposite hill under which the camp was pitched, an extensive view was obtained over rocky mountainous country. A natural rock gateway or arch of sandstone is situated half-way up this mountain. Rain-storms were seen all around, but a few drops only fell, accompanied by a violent wind, at midday. A number of cattle water here.

3rd and 4th.—Camped; very hot.

5th.—At 7 a.m. the thermometer stood at 70°, the aneroid 29.48. As the natives said we should find water at our next camp, we took only 50 gallons of water with us. We followed our sable guides down this creek and through another gorge, where the Shapana spring lay. Caves were seen in the face of the hills, and a peculiar rock about 30 feet high and about the size of a man showed high up on a rocky cliff. A fine rock-hole was passed with a high range on either side. Granite, quartz, and metamorphic sandstone dipping east and west. At 3.40 we passed one of Mr. Flint's camps, F K XV, and at 4.35 p.m. we camped on good feed a short distance from a rock-hole; an old native encampment. For the most part we have been travelling up the bed of the creek, with a high bold range on either side, the formation metamorphic sandstone, with almost perpendicular strata, having a slight dip to south; direction east and west. Some large reefs and quartz; granite, and a rock of a granitic slaty formation (if I may be allowed the expression), of a greenish hue, with thin veins of quartz running through it.

Fine gum-trees, good bushes and grass, salt-bush, and ti-tree. Animal and bird life very scarce. From the top of a hill above the rock-hole one of our guides pointed out the direction which we had to travel to pass through this range, showing me a hill, and repeatedly saying that I was to "No lose him creek," and when I reached that hill I should find another creek going in the opposite direction. This I was to follow until I found an "old man creek," on which I would find a big water. He told me he had never been there: "No been see 'um, been hear 'um all right."

6th.—At 6.30 a.m., thermometer 68°; aneroid 28.44. We found that our guides had deserted us during the night. I took a supply of water from the rock-hole, and proceeded to follow the directions so carefully given yesterday, always keeping on the creek. The rocks became more slaty in appearance, dipping to the north. Ranges extended half a mile on our left, low broken hills intervening; good travelling, the vegetation being salt-bush, acacia, tea-tree, white gum, mulga, cork-tree, and good grass; the ground very rocky. The hills on our right were round and regular; on the left high, broken, and precipitous. The creek continued very tortuous in its course through low, stony, mulga-covered hilla. We crossed the watershed at 2.4 p.m., the aneroid marking 28.10, thus making us 650 feet above our last night's camp. We followed a watercourse trending north, and at 3 p.m. entered a district of micaceous sandstone with almost horizontal strata, dipping north; then followed low hills of white quartz. From the top of the watershed the main ranges go away west, with some fine high and precipitous hills in it. White quartz-blows to be seen standing up on all sides. No slate as yet met with. At 4 p.m. we came upon a very big gum creek heading from the west, 10 chains wide, full of gum-trees of large size. We followed this creek easterly until 5.30 p.m., when we camped near an old native encampment. This creek is probably identical with the Hale. Marked a white cabbage gum-tree.

Sunday, 7th.—At 6 a.m., thermometer 62°; aneroid 28.30; lat. 23° 18' 14" S. Followed creek north-east for one mile, where it formed a junction with a large one, down which a good flood had passed some two months before. We dug in a likely-looking spot for water without success. Followed this creek easterly, with low hills on both sides. Splendid feed, salt-bush, good grasses and herbs, acacia, and eucalypti.

The creek has a gravelly bed of decomposed granite and quartz and gem sand. We found a lode of tin in quartz and granite running north and south through a granite hill. I had been all day searching for water. At noon the caravan was passing down one channel, I another, while a third channel was between us. I was attracted by some very green grass in this third channel, and scooping out a hole with my hands, found within six inches of the surface a plentiful supply of pure water. I called a halt, and we cleared out a hole for the camels to water at. Marked a tree. This is the first creek we have seen which has been flooded this season.

8th.—Latitude 23° 15' 25" S.; at 7 a.m. thermometer 70°, aneroid 28.43, south-east wind, with a few fleecy clouds. We followed the creek down, low hills closing in, wet sand in many places. Found another tin lode; passed through a gorge, metamorphic sandstone, strata twisted in all conceivable directions and shapes. Gum creeks come in occasionally. Some very high cliffs. At midday we found rushes, luxuriant young gum-trees, and a granite bed crossing the creek, the granite completely studded with garnets or rubies. At 4.5 p.m. the creek suddenly changed its course and entered a gorge. Halted here on good feed for our animals. I went on down the creek to ascertain if it were possible to get the caravan through; and at a distance of 300 yards came to water and big boulders, where I had to leave

my camels. I walked on down the winding "Glen Annie" (so named after my wife), for three miles; finding plenty of permanent water in it. Cliffs rise perpendicularly to a height of 400 to 500 feet; the gorge only one to two chains wide. I returned over the range, and saw, at a distance of about five miles, a plain stretching away south-east as far as the eye could reach. Some hills were visible 30 miles away; the course of this creek could be traced for many miles down the plain by the green gum trees. Warman found a rock-hole close to camp on the north side of the creek, and shot a snake 15 feet long.

9th.—Sultry, no wind. As I found further travelling down the creek impossible, Glen Annie being impassable for loaded camels, I resolved, owing to the dry state of the country, to make direct for the "Plenty Wells," marked on Mr. Winnecke's map. Went away to look for a passage through the rough country. From the top of a high hill (Mount Coghlan) overlooking the glen I could see the probable direction to get out. After leaving the creek valley, we found the travelling very rough indeed; jumbly hills, creeks full of boulders and dense tea-tree, hills covered with mulga, and very rough. But we found two good rock water-holes. At one point reached I was within half a mile of the plain, and had to return some miles on my tracks. The promised land, plains stretching away in the direction I wished to travel, lay beneath me some 400 feet; by leading the camel I with great difficulty descended to the plain and went across, two or three miles, to a bold black range. Found a gum creek which I followed up, and was fortunate enough to find a passable route for the caravan. Reached camp at sundown. Marked tree.

10th.—Cool, south-west wind, cloudy, rain. At 7.30 a.m. the thermometer marked 72°, aneroid 28.65. Went along my tracks of yesterday, and camped for dinner under the "black range" at the mouth of a gully. We ascended 600 feet to get a specimen of a low tree which proved to be a fern palm; this was at least 100 feet from the summit; and we also found "bread fruit." The granite of which this range is composed is studded with rubies or garnets. We continued our march along the foot of this range, and had a slight fall of rain. We passed over good country—low hills, good grasses and bushes in abundance. Pitched our tents under Mount Wallaby, and prepared for a wet night.

11th.—There was no rain during the night, but it was very heavy and threatening this morning, and there was no wind. I sketched the surrounding country from the top of Mount Wallaby. The formation is granite. There are about 80 to 100 square miles of excellent country here. Started at 8.10 a.m., and by climbing a number of hills, one after the other, I was enabled to direct the movements of the caravan into the best routes for travelling.

We made 20 miles through a most interesting country; low broken granite hills on one side, with high and fantastic peaked granite ranges beyond. There was good grass and bushes in abundance; green rushes growing in the gum creeks promising water at shallow depths. Some of the hills are clad with pines, others with palms, while others appear to be masses of bare rock. On the face of a precipice some 300 or 400 feet high, a white vein of quartz could be seen stretching from top to bottom, looking in the sunlight much like a thin stream of water. Passed through the range and emerged on to a small plain, with huge piles of rock standing about. We camped at the foot of a high leaning peak; I obtained many new plants in this neighbourhood, and some good sketches were also taken. The night was wet.

12th.—Wet morning. After dinner the weather cleared somewhat, though the tops of the highest peaks were still enshrouded in heavy clouds. The rain had been of little use, only leaving a little water on the rocks. Our caravan wound through low broken granite hills with much white quartz strewn about; a big range on

both sides. The granite is soft and rotten, in layers, direction north-west and south-east, dipping north-east very flat. We followed up a watercourse and passed at the foot of two black-looking conical hills, and then had some awkward travelling over large stones and through dense tea-tree scrub. We camped on an open space at the entrance to the gorge. The vegetation was chiefly myall and gum-trees, pines, and willows. Prepared for rain.

13th.—A steady light rain fell during the night, not sufficient to make the creeks run, or leave any water lying about, but still enough to make everything damp and uncomfortable. The wind was south-east. At 7 a.m. the thermometer marked 70°, aneroid 28.46, cloudy and pleasant. From the top of a hill just above the camp, I could see the plain stretching away north and east, and lying some 300 feet beneath me. The small tableland, shown on Mr. Winnecke's map as being near the Plenty Wells, was visible about ten miles distant.

Leaving camp, in half a mile we were on the plain, splendid travelling, lightly timbered, and fairly grassed; reddish sandy soil, quartz pebbles; tin in the ranges which are of sandstone and granite. Near the tableland we entered a dense gidyea scrub; no grass; quartz pebbles; no sign of gold. According to Mr. Winnecke's map, we should have been in myall thickets; the surface was splendidly grassed. This lasted for two miles, after which we entered spinifex on a sandy soil. At 3.25 p.m. we stopped in the bed of the Plenty River. (What a misnomer!) Ten chains to the westward I found the wells, or rather the place where they once had been, for now, to my great disappointment, there was no evidence of water. We cleared the drift sand out of one well to a depth of ten feet, but there was no sign of water. The sandy sides of the well ran in like water, and nearly buried Warman. Fine gum trees and acacias grew in the creek-bed, and we saw old native encampments and marked trees. The whole country is very dry. I had depended on getting water here, consequently my failing to do so was a great blow to me. We searched up and down the creek and around some low hills, but all in vain.

14th (Sunday).—Our camels have not had a drink since last Sunday, and if we have to go back to Glen Annie before finding water they will suffer much. We have no rain, and the night was very cold. At 7 a.m. the thermometer stood at 62°. Decided to leave all the goods here in charge of two men and take the camels back. I hoped to find a sufficient supply of water on the rocks to fill two casks and water two camels, after which George and I would return to the depot and then go down the Plenty and Marshall channels to the permanent water marked on Mr. Winnecke's map. The other camels would continue on to Glen Annie if necessary. Lieutenant Dittrich had a fine collection of plants which we had assisted him to gather; but owing to the damp weather they needed to be put out in the sun to dry; accordingly I asked him if he would stay in camp, thus having plenty of time to attend to his plants and give his riding camel a spell. No, he would not stop but preferred going back, so I had to leave Warman and Mr. Leech. At 8.30 we started to retrace our steps, the camels running loose. At 11.30, seeing a big bare rock at the foot of the range, I instructed the others to go on, leaving me to overtake them after going to this rock. Happily I found a watercourse at its foot, and a fine-looking rock-hole which was quite full of sand and stones. I scooped out a hole about two feet deep with my hands, and found a little water, but broke my finger-nails on the rock bottom. After a few minutes' hesitation I decided to call the party back, and, running to the top of the rock, fired two shots (the usual signal); they heard and came across. We commenced to clear the hole out, watered the camels, each bucket of water being the last one I expected to get. Still we were able to obtain more, and filled up all our casks, then brought up the camels, two at a time, and let them drink their fill, so that there would be as few as possible

to go back in search of water. By 10 p.m. we had cleared out about ten tons of stone and sand, and emptied the hole, having taken out 250 gallons, all the camels having as much as they could drink, besides filling up all our water-vessels.

15th.—Cold night, followed by a clear warm day. We reached the depot at 1.10 p.m., and found all well. Packed up and proceeded down the Plenty, intending to make for each of the waters marked on Mr. Winnecke's map. About half an hour before camping, which we did on the sandy bed of the Plenty, we came upon fresh tracks of four natives, and the fur of an opossum which a native had caught in a hollow tree, the marks of the native's teeth being on the edges of the hole which he had thus enlarged. After pitching camp I went to look for the natives, and half a mile distant up the creek found their tracks; I followed them for a short distance, when my attention was attracted by a spear leaning up against a tree. Looking around I saw two nude figures disappearing in the fast-gathering gloom of the evening, laid my camel down, and called them in their own language to stop. This only increased their pace; quickly remounting I sent Lukkool along at racing speed, and soon had the satisfaction of seeing the natives literally run to earth; for they took refuge in a bush, and lay with their faces covered. Dismounting I seized one by the wrist and dragged them both forth. I was disappointed to find they were children (girls), one six and the other nine years old; they were dreadfully afraid of the camel and me, and clung to each other; I led them into camp, where I tied one up and gave the other some flour and tobacco, took her a little way from the camp and told her to go to the other natives, but she would not leave us.

We hoped that she would rejoin the others, and that the next morning they would come to me and guide me to the water which I supposed was somewhere near. She followed us back to the camp; consequently she was also tied up to a flour-bag close to my bed; I gave them supper, covered them with shelter and a blanket, and set double watch, in case of attempted rescue or escape. While I was after the Quûs (girls) a native crossed the creek in sight of the camp, but was in too much of a hurry to be interviewed.

16th.—Nothing disturbed us during the night, and at daylight the Quûs awoke, their faces all beaming with smiles, they having slept peacefully the whole night. Directly after breakfast Lieutenant Dittrich, Warman, and I taking the girls went to find the water; they took us to within a few yards of where I saw the spear last night, and there we found water in skin bags, meat both cooked and uncooked. This was where they had intended to camp.

The Quûs satisfied themselves that the others had not camped here, picked up the tracks, and followed them for some distance; they had been running at a great pace, one fellow twisting and doubling like a hare. Our young guides made us understand that it was of no use following the tracks any further, so we returned to camp; by this time the poor creatures were not at all afraid of us, and walked along with us quite happily.

Understanding that the water was some distance to the south, I started the caravan off easterly, while I with the two Quûs went away south for Quattha Ninta. After passing over nine miles of good country, grassy and bushy, with low hills dotted here and there, we came to a native well, six feet deep, in a sandy gum creek. The sand had, as is always the case, fallen in, and no water was visible. The smallest girl jumped down, and in a very few minutes, digging with her hands, revealed the existence of the precious fluid. What the supply was I could not ascertain. I gave Lukkool a gallon in my satchel. Leaving the two Quûs sitting beneath a gum tree with their arms around one another, I went to overtake the packs. When going, the Quûs moved their hands, and called out "Larrama, Larrama." Reached the camp at sundown, some six or eight miles from where I expected to find it, as my instructions as to direction had not been carried out.

17th.—Proceeded on our journey, making for a spot on the Marshall marked by Mr. Winnecke as "good water." Passed a native well, and cleared out four feet to blue clay bed of creek, but found no water. At 4.15 we passed Mr. Winnecke's marked tree, but there was no water on the bottom of the creek. The country was very good; fine, open, grassy, timbered, and park-like. Camped at 5.30; country changing for the worse, spinifex, mallee, and low bushes. This creek (the Marshall) is very disappointing, it is so dry; no water to be found wherever we tried. I am almost afraid the "permanent water" will fail us.

18th.—When Joorak brought the camels in he reported that he had seen natives camped close to a well, in which was some water, about three miles down the creek. We thereupon travelled down. We found but little water, and that was on the blue clay bed of the creek; the natives had gone. We camped, and sank a small hole in the blue clay to enable us to bale out what little water there was. The supply was indeed small, only one gallon in 20 minutes. Leaving the party here to give the camels whatever water could be got, Warman and I went down to the "permanent water" of Barclay and Winnecke. We had passed another place where Winnecke had marked "water in sand," but there was none. We found good country, with numerous old native camps and fresh native tracks going down the creek.

19th.—We were fortunate in finding water in the sand at Winnecke's marked tree, but certainly it is not permanent water, for in a month I am certain there will be none there. Returned to camp with the good news. Each of the camels had had a bucket or two of water. The natives had tried during the night to get at the well, but as every 20 minutes a man went down to empty the hole, the poor creatures had to remain thirsty. The bed of the creek is formed of decomposed granite and gravel, intermixed with blue clay, eight feet to the bottom. Immediately on reaching camp we packed up, had supper, and proceeded down the creek by moonlight, reaching the spot I had selected for a camp at midnight. This is an open space about 30 chains from the water—a fine safe camp should the natives prove troublesome, as it is more than likely that a large number will be camped in the vicinity, and we intend to remain three days to rest the camels, the feed being good.

20th.—After breakfast Warman, Joorak, and I went down to the water-hole to clean it out, thus enabling the camels to drink. Just before reaching the hole I saw a native walking away from it. Called to him, he stopped, I held up my hands, when he dropped his spears, held up his hands, and came towards us. He appeared not at all afraid, but embraced us each in turn by placing both his hands on our shoulders. He could speak no English; turning round to a low hill he called out, when three lubras (two old and one young girl, about sixteen years of age) came towards us; we had to submit to an embrace from each of these. Although their language is similar to that of the natives of the Macumba and Finke, our limited knowledge of that was of little use to us.

From this point I proposed making as direct as possible for Lake Nash, keeping well to the eastward of Mr. Winnecke's track.

21st (Sunday).—In camp. Joorak reported having seen thirty-five natives in the scrub about half a mile from the water; at first they were very frightened, but afterwards very friendly. We marked Winnecke's tree and a tree at the camp.

22nd.—Went with Joorak to find the natives, but they had not camped in the same place. Joorak afterwards saw them when out for the camels, and brought four men into camp. I understood from them that there are three or four waters over our intended route, and one of them will go with us as a guide. They also promised to bring in a *wai* (small boy) for me next day, in exchange for our dog "Toby."

Close to camp I found water by sinking three feet on the bottom of the creek, but,

as before, the supply was too small to be of any use to us. Granitic, metamorphic sandstone of a greenish hue, very clear quartz, good soil, bushes, and trees, gidyea, gums, box, &c. Thermometer during night 55°.

It appears as if there had been a long drought over the Plenty and Marshall basins, for water is everywhere very scarce, and the natives are divided into small parties and scattered over the country. I think water could be obtained on the Marshall by sinking through the blue clay bottom. Below this water-hole there are plenty of very green bushes, and all the plant life appears fresh and vigorous, so I imagine a better supply of water could be obtained there. We dug in several places, but the sand was too bad to allow us to bottom any of the holes. Rain had fallen here (east of the water-hole) about a month ago.

23rd.—Cool morning, thermometer 62°, east and south-east wind, few clouds. Joorak brought in twelve natives, one being a little boy whom his father, our first acquaintance, intended me to have. I considered the little fellow too young and not over intelligent-looking, so did not take him. A young man was then given me to act as guide to certain waters; a smart, active-looking fellow, to whom I took a fancy, and whom I resolved to keep, if possible; I cut off his hair close, gave him a red cap and a good breakfast, then took him down to the water-hole for a wash. When returning to camp he asked permission to go somewhere, I was to go on, and he would overtake me. Thinking that if he wished to run away it would be better that he should do it here than after we had started, I let him go, and he was out of sight in an instant. I waited some time, but he did not return. When I reached the camp alone the natives were very anxious to know what I had done with Wei; they seemed afraid I had killed him. We filled all our water-vessels, watered the camels, and after an early dinner we started with another native as guide. The Quū, the young girl before mentioned, wanted to come with us, and her friends were quite willing that she should, and when the boy (our guide) got up on my camel, she mounted behind him in the twinkling of an eye. She was very much disappointed when I would not let her stay.

For five miles we travelled over good country, then entered a spinifex district with mallee of a stunted habit rarely exceeding twelve feet in height and scattered in clumps.

24th.—Warm night. Our guide slept quietly. In four miles we passed the end of a low range of hills with good country—gidyea and grass. Crossed another creek on which is an old gum tree, reminding us Adelaideans of the "Old Gum Tree" at Glenelg. Country improving, being very well clothed with various grasses. Good rain had fallen here. At 11.40 a.m. we camped on a very nice water-hole, two chains long, in a rocky creek. The water contained crabs and crayfish, with a growth of rushes. I planted here a number of date-seeds, and refilled the water-vessels, as this water is much better than that from the Marshall. Leech and I went to the top of the range (Tarlton Range), expecting to see "Goyder's Pillars," which ought to be very close to us. We could not see them, nor did they come in sight afterwards, although we passed to the north and east of the range. The hills are stony but beautifully grassed, and here form a circular valley.

25th.—Clear, south-east wind. At 7.30, thermometer 74°, aneroid 29.34. Travelled northerly along the foot of the range over very nice country eminently adapted for the conservation of water. The country here reminded me much of the south, the grassy slopes with the scattered bushes and trees, here and there a water-course marked by a dark line of trees leading straight up, or in a curve winding up the range, and appearing like the hedges in the south. These slopes are, on closer acquaintance, found to be very stony: sandstone, freestone, waterworn quartz, pebbles, and ironstone; the herbage consisting of Mitchell grass, salt-bush, and a

little samphire. Passed a small water-hole at the foot of the hills. As we were travelling, a most unfortunate accident occurred; one of the camels fell, throwing both his riders; fortunately they were not hurt, but the poor camel was unable to rise. We assisted him up, but he only walked a few yards and again fell. Joorak burnt the shoulders, but did not effect a cure, for poor "Baby" never again attempted to rise. This was a most unfortunate accident, for everything was going on so well. Splendid country, feed and water, all in good health and spirits, and a good native guiding us to another water, from where it would be easy to go to Lake Nash.

26th.—Cool, clear night. Immediately after breakfast we went down to the sick camel, but long before we reached him we could see that he was almost, if not quite dead. He lay on his side, and was much swollen; he had not struggled much, but had moved about ten yards. In ten minutes he passed out of this world of trouble. I made a post-mortem examination, and found that the backbone at the root of the neck was literally smashed, the adjacent bones being splintered and the parts much bruised. We returned to camp and packed up. In six miles we came to a "nia," or water-hole in a fine gum-tree creek; a heavy flood had been down this season. Magnificent grasses everywhere. Limestone and a coarse yellow sandstone; really a splendid country, luxuriant herbs, creepers, grasses, and bushes; box, acacias, &c. Undulating, with limestone rubble.

27th.—Latitude 22° 35' 47" S. These waters had led us out of our direction, but I started again as direct as possible for Lake Nash, following the lay of the country to get good travelling. Our guide was much disappointed when I refused to go further east, and kept pointing away E.N.E. saying "Quattha." After going four hours the boy saw a smoke bearing 65°, and became very excited, exclaiming "Oorn, Quattha, Qui" (Smoke, water, lubras). Judging this smoke to be but a short distance away, we turned towards it, thinking it as well to fix the position of another water. Soon we entered country which was alternately gidya and good grass, mulga and good grass, and low undulating sandy country, covered with spinifex, mallee, box, grevillia, and many good bushes.

28th (Sunday).—Warm, clear night. We travelled all day over the same kind of country, in the direction of the smoke, which still seemed as far off as ever. At 4 p.m. we entered a tract of mulga scrub, which had been set on fire, and passed through it as directed by our guide. At 5 p.m. I went on ahead to look for a grazing place, and a little over a mile distant saw a promising watercourse coming through low stony hills, with a fire on the other side, and numerous fresh native tracks. We turned towards the fire and almost immediately the boy saw a number of natives camped under some shady bushes. The boy called out to them and they at once jumped up, not having seen us coming, and scattered in all directions. The boy gave chase and called out to them; two women, attracted no doubt by a familiar language, were the first to stop; they soon found he was a brother, and embraced him. The others seeing this stopped, and one by one came up to us until all were gathered around me. These people had evidently only come here this afternoon and had cleaned out a well, and were resting after their labours. We camped close by in a fine tract of pasture.

29th.—We deepened the well but found there was no supply. Understanding from the natives that a water-hole was not far distant to the south east, I and Joorak guided by a native took all the camels and empty water-vessels and proceeded over good country for 12 miles, when we found a nice water-hole. The natives inform me that there were some other waters close by. We turned the camels out for hour or two and then went back direct to the camp, which we reached at 10.30 p.m. distance 10 miles.

30th.—As we would not go further east our guide left us. We passed over his

sandy soil, well grassed; patches of flint-strewn ground; patches of thick mulga scrub with an occasional cabbage gum, gidyea, and box, level, no stones, until, late in the afternoon, we entered low hills densely clothed with gidyea and the country around cut up by heavy rains. It was very hot; 98° in the shade at noon.

31st.—We are now 76 miles from Lake Nash; lat. $22^{\circ} 3' 33''$ S.; thermometer 66° at daylight; aneroid 29.59. The camels are getting tender-footed, as we have had so much broken flint ground to travel over. Much of the country passed over to-day is subject to inundation. Crossed a high rise, from which an extensive view was obtained. Good country.

April 1st.—Thermometer 56° ; aneroid 29.44. Travelled over low hills and undulating country—mulga-covered hills, gidyea flats, clayey soil, good grasses, loose stones, ironstone, flint and sandstone—a pleasant country, enlivened by birds and wallabies. At 2 o'clock we entered the first Mitchell grass plain, which stretches away north-east as far as the eye could reach, broken only here and there by patches of gidyea. The same kind of country continued all day.

2nd.—Thermometer 52° ; lat. $21^{\circ} 35' 53''$ S. The ground travelled over was a friable, clayey loam, with loose flint stones and grass. We crossed the Woodroffe. It was insupportably hot; 103° in the shade. Halted at 2.25 p.m., as it was too hot to travel. Supper at 6.40 p.m., and then resumed our journey, having our meal on flooded country at midnight.

3rd.—On again at 1.5 a.m. over flooded country. At 2 entered a district of spinifex and loose stones, which continued with occasional breaks until 4 a.m., when, meeting with some tame cattle, we camped and turned out, expecting to find a path leading into water. We are about eight miles from Lake Nash head station. At sunrise we were again on the way, finding a path leading easterly over good limestone country. At a distance of three miles we crossed the road and the boundary line just by a post marked "lat. $21^{\circ} 5' 11''$ S. 338 miles 10 chains." Close by was the Georgina or Herbert, with magnificent water. My eyes were very bad this morning, caused partly by the night travelling, and to-day with a north wind blowing in my face as we travelled up the road to the station, a distance of nine miles, they were indeed very painful.

We thus safely completed our journey of 700 miles from Alice Well to Lake Nash.

Two days' rest at the station put my eyes all right. An interesting tract of country was passed, seemingly as high as the surrounding country, with no creeks in it, yet almost anywhere water can be obtained in large quantities by sinking five or six feet. In the same locality silver lead exists. A small piece I tested with the blowpipe gave a large percentage of lead and showed a small point of silver.

All the natives met with have the same manners and customs; the language is also the same as that of the Macumba and Finke districts, excepting the terminal letter of words; for instance, Quattha becomes Quatthee, Pittara Pittaree, and so on. The natives gave us not the slightest trouble.

Our journey was pretty hard on the camels, but comparatively easy for ourselves.

We found letters and newspapers awaiting us, and received a hospitable welcome from Mr. and Mrs. Farrar, of Lake Nash Station, to whom we are much indebted for many kindnesses shown us during our three days' stay with them.

Evidences of the original occupation of the country, now some 25 years since, when cattle and sheep were first depastured here, are to be met with in various places at Lake Nash, farther up the Herbert and on the James and Rankine rivers, which join the Herbert 30 miles north of Lake Nash. There are still standing old piles, showing the sites of huts, stone sheepyards, &c. Lake Nash is a fine sheet of water on the Herbert river, many miles in length, but not absolutely permanent, as

during the last great drought it was quite dry, and Mr. Farrar had to remove all his stock. While he was away with his cattle, Mrs. Farrar was left for six weeks, her only companions being her son, a little fellow nine years of age, and a small blackboy to look after the station and a few horses.

When we reached Austral Downs, 30 miles distant from Lake Nash, my camels were so tender-footed that it was impossible to send to Rocklands Station, 60 miles distant to the north-north-east, where a fresh supply of provisions was awaiting me, having been sent there to my order some three weeks previous from Burketown. Accordingly I arranged for a team to take them on to Avon Downs, within 30 miles of which my survey work would take me in about six weeks later. In the meantime I got sufficient rations, by the kindness of Messrs. Little and Affleck, to carry us on until it suited me to send into Avon Downs for my own. We commenced to survey the boundaries of runs on the 12th April, and were occupied in this work over a wide district until October, by which time we had surveyed 550 miles of boundaries and connected the eastern frontier of the province with the Overland Telegraph line.

The companions of my journey to the Gulf, Lieut. Dittrich, Mr. Leech, Warman, Joorak, and Dick, proceeded along the road to Boroloola.

The Downs country is a continuation of Barkly's Tableland, usually spoken of as "The Tableland." Austral Downs is a sheep station belonging to Messrs. Richardson and Little; the homestead is built on a point of land between the Herbert and James rivers, and is a substantial structure, consisting of three good roomy buildings of wood and iron, besides large sheds. A good many miles of sheep-proof fencing has been erected. The sheep, in number about 12,000, are doing well. The country here is very good, being high, stony downs, very well grassed, and clothed to a good extent with blue-bush. There is plenty of water in the Herbert and James rivers, besides in the Shakespeare and other creeks. The same class of country, improving slightly, continues 50 miles northwards to Avon Downs on the James river. This is also a sheep station, with many miles of sheep-proof fencing, and about 12,000 sheep. Mr. Affleck, the manager, has constructed a very fine dam across the river, throwing back a large body of water; he is building a substantial homestead close by, stone being used for the manager's house. Some four miles from the homestead a well was sunk about 150 feet, and a very large supply of really good water was obtained. Dams are being constructed at different places on this run, and improvements generally are being carried out energetically.

Some 25 miles to the eastward the owners of Rocklands are building a station on Happy Creek, where they have good country and permanent water. Stone is also being used in their buildings. The stock consists of cattle and horses, but soon sheep will take the place of the larger animals.

The trade of these stations, though situated in the Northern Territory of South Australia, must find its outlet at Burketown in Queensland, as that port is the nearest and most convenient. The road leads west of north from Avon Downs over extensive downs, very well grassed, relieved by patches of galyea and a strip of so-called "desert country" for 30 miles to Lorne Creek, when it turns more northerly, and in 20 miles passes a large reservoir at the time of our visit being constructed by Messrs. Richardson & Little. Fifty miles farther takes us to Alexandra Station, belonging to Messrs. Forest, Collins, & McIlwraith. It is a cattle estate on the Playford river, and the most easterly station on the tableland whose trade will be with the newly opened port on McArthur river. A large supply of fresh water has been obtained at a depth of 58 feet at this station. This firm holds a large tract of country, the greater portion of which is first class, the grasses being of the best, the country having stretches of very luxuriant downs, plains,

and low hills, watered by the Buchanan, Playford, Bluebush, and Brunette creeks, in all of which are large water-holes, also by permanent springs. Some very good timber for building purposes is obtained a few miles north of the homestead. The cattle and horses were all looking well. The highest recorded shade temperature at the station is 110° , while the winter sends the thermometer below freezing-point very frequently. This is the most comfortable homestead on the tableland. Again following the road, we travelled westerly for 18 miles along the Playford, whence a branch road continues along the river to Alroy Downs, about 25 miles distant, situated on the Lower Amazon Lagoon. The same class of country continues right through, but a very valuable salt bush grows on this run, which is but rarely found on any of the others. The main road turns N.N.W. and at a distance of 22 miles crosses the Bluebush Creek, in which are some large water-holes; continuing much the same course still over well-grassed downs for 23 miles, Brunette Creek is crossed, and we find ourselves at an outstation of McDonald, Smith, & Co., of Sydney. There is very fine water here; at the time of my visit there was continuous water for 20 miles, with some very large and deep holes, terminating in Lake Sylvester, which is but a shallow basin of large extent, there being quite 10 square miles of water when I saw it. Following up Brunette Creek north-easterly, some of the finest country in Australia is passed over, with splendid water-holes. The road now leads west 18 miles to Corella Lagoon, a large water-hole over 5 miles long and perhaps thirty chains wide at the widest part. On this lagoon two stations have been formed. South-south-east and south-west of Corella Lagoon is an extensive tract of country subject to inundation by the water from the Buchanan and Playford rivers, Bluebush Creek, Brunette and Corella Creeks, which form lakes of greater or lesser extent, most of them holding ten months' water. This country is covered with blue-bush, polygonum, and box, amongst which the cattle remain during the dry season, finding ample sustenance from those bushes, which enable the stations to muster, at any time, a large number of fat animals. There are about 250 head of horses and 12,000 head of cattle on Buchanan Downs. Both classes of stock breed and thrive well.

The road now leads north for 18 miles over fairly grassed downs, when it enters forest country, generally called desert. In my opinion, this is better cattle country than most of the downs or plains, for, although we find strips of worthless country, spinifex, &c., yet there are many of the best cattle bushes and a large extent of good grassed country, the grass remaining green longer than it does on the exposed plains.

At 40 miles from Corella we find Anthony Lagoon, on which is situated the homestead of Cresswell Downs Station. The station buildings are at present only of a temporary character. Some 3000 or 4000 fine cattle, besides a large number of horses, are depasturing on this creek, in which are other good waters besides Anthony Lagoon. The beef killed here is quite fit for the southern markets, and some hundreds of the finest fat bullocks can be taken off the run at any time. Here is the first store, commonly called "shanty," we have met with since leaving Dalhousie Station. Boroloola is but 170 miles distant, yet the prices charged to travellers for goods are something surprising. I quote a few lines:—Sugar, 1s. 3d. per lb.; rice, 1s. 6d.; preserved potatoes, 2s.; currants, 2s.; raisins, 2s. 3d.; jam, 2s. 6d.; and rum 18s. per bottle. Here again the road divides, one branch going due west for 42 miles, crossing the Cobbs and Turkey creeks, in both of which are water-holes, standing in ordinary seasons up to October and November, to Eva Downs station, owned by E. Maher & Co., of Sydney. The homestead is built on an elevated spot, amongst a clump of dark-green gidyea-trees, and overlooking a considerable extent of good country, all nicely clothed with the best grasses and good bushes and trees, with here and there

a low rise, clothed with spinifex. The manager's house is of wood and iron. Leaving Eva Downs, we still travelled west. Though when we went along in August there was no track, there is now one well beaten, leading to Powell's Creek, about 85 miles distant, crossing the Broad at 9 miles, the Bundara in 43 miles, which is the last water until reaching the telegraph station at Powell's Creek. The country is fairly well, in places very well, grassed; good cattle bushes and blue-bush are plentiful. Water is scarce, but easy of conservation. I omitted an important feature at Eva Downs, viz. a well about 60 feet deep, with a good supply of good stock water.

From Cresswell Downs the road leads north-easterly for 35 miles over well-grassed downs and plains, with patches of flooded country and good bushes, to Walhollow Downs. This, the last station on the tableland—distant about 135 miles from Boroloola—is owned by J. B. Christian, of Sydney, and managed by his brother. The country is very good, having all the best grasses growing in profusion, and many good cattle bushes scattered in large patches. It is very fairly watered. The cattle and horses all look well. The homestead is situated on the bank of a large gum creek, in which are some nice water-holes, the principal one, Collabirrian, being 4 miles south of the station.

This vast extent of downs and plains, called "The Tableland," drained and watered by the Milne, the Woodroffe, the Herbert, the Shakespeare, Happy Creek, the James, the Rankine, Lorne Creek, the Buchanan, the Playford, Bluebush, Brunette, Corella, Blonde, Croaker, Cresswell, and Turkey Creeks, embracing an area of about 25,000 square miles, with, I think, an average rainfall of about 20 inches, is destined to become, ere many years have elapsed, one of the finest wool-producing districts in Australia. The construction of dams and excavation of reservoirs, from the nature of the soil and the contour of the country, will be easy and comparatively inexpensive. Good water will also be obtained by sinking, all over the tableland.

Upon the development of this country depends the advancement of Boroloola and the success of the MacArthur river as a port. There is no doubt that this is the natural outlet for all that country. The road from Walhollow Downs Station leads over the heads of the Kilgour and down the South Australian valley, than which it would be difficult to find a better or prettier bit of country anywhere.

After we leave this valley the country becomes less rich in its character, though the grasses are still very good, and is permanently watered by springs. Limestone and sandstone are the prominent rocks. The country is well timbered, and the hills, though rocky, are well grassed. The country is broken into valleys and low ranges. Very fine timber grows in the valley of the MacArthur, and the grasses remain good right through to Boroloola. Thirty-five miles before reaching the township we overtook the camels at the MacArthur river head station, owned by Messrs. Amos Brothers & Broad, of Sydney. Twenty thousand head of cattle are depasturing on their immense run of 9,000,000 acres. Improvements are being carried on with considerable energy by the manager. Three out-stations have been formed. The homestead consists of six large wooden buildings, and is very comfortable. It is situated on the east bank of the river, and has a pleasant outlook over timbered, well-grassed country, backed up by bold hills from 3 to 6 miles distant. The manager has a fine garden on the banks of the river, in which are growing bananas, figs, Cape gooseberries, melons of all sorts, English and sweet potatoes, cabbages, lettuces, tomatoes, beans, and many other vegetables.

Boroloola township consists of three stores and two hotels, a butcher's shop, in which for about six days in the week there is no meat, a saddler's shop without any saddles, and a Chinese garden. A few weeks before my visit, "grog," it is alleged, was to be had at all these stores, and the place was the resort for the desperate characters—horse-thieves and such-like—from the back settlements of Queensland,

but the news of the arrival of the special magistrate, Mr. McMin, dispersed all the bad characters, so that when we were there the place was peaceable and quiet.

Fine timber is obtainable here, Cypress pine, Casuarina, paper-bark, gums, blood-wood, Leichhardt pine, messmate, currajong, and a very fine timber locally called mahogany. I saw no minerals, although cinnabar is reported to have been found. Copper and silver lead will be found, and probably gold.

We remained only two days at Borooloa, when, having despatched two of my men with the camels and stores for their long journey of 1300 miles back to our starting-point, Hergott Springs, we set sail at midnight on October 19th, in a small boat to join the *Ellerton* schooner lying at anchor some 27 miles down the river. The river having been described by Captain Carrington, I will not say anything beyond that it appeared to me to be a fairly good waterway, somewhat difficult for sailing craft, but very suitable for light draught steamers. After taking in ballast we kedged the *Ellerton* for a considerable distance each day, getting aground more than once, until the following Tuesday, when we got under way at sunrise with a strong south wind bowling us along quite merrily. In 20 miles we passed clear of the Sir Edward Pellew group of islands, and then found a very heavy sea running, which, as our good ship was only in ballast, tossed her about considerably, making all the passengers but one and some of the crew sick. I was sleeping on the main hatchway when a heavy sea striking us under the counter gave the ship such a shock that I was thrown right over against the bulwarks and nearly overboard.

We ran between 230 and 240 miles in the first 24 hours; the wind followed us around the coast, each day becoming lighter until at 8 p.m. on Monday, November 1st, when off East Point at the entrance to Port Darwin, a very heavy squall struck us, throwing the vessel down on her beam-ends, and had not five sails burst and blown away we must have capsized. Next morning we sailed into the lovely harbour of Port Darwin, where after a week's stay amongst my old friends, we embarked for Sydney on the s.s. *Tannadia*.

Our journey was thus successfully completed, reaching the north coast of Australia rather over twelve months since we left Adelaide and having travelled roughly about 4000 miles.

VOCABULARY OF THE LANGUAGE SPOKEN BY THE NATIVES IN LATITUDES 23° TO 28° S.,
as obtained by a Member of my Expedition, 1885-6.

English.	Native.	English.	Native.
Kangaroo	aura owūra.	Fly	amings.
Opossum	undina.	Snake	abma, wadna.
Dog	lukra.	The blacks	arralla arrilla.
Emu	alia.	A lubra (young) ..	quei.
Black duck	chickeway.	Orayfish	yuru.
Wood duck	erialta.	And	eripin.
Pelican	criwanta.	Father	acknja.
Crow	angela.	Mother	mia.
Cockatoo	eranda.	Sister	kongara.
Swan	andelūra.	Brother	eckelgecka.
Egg	querta.	A baby	kinka.
Track	inga.	Boy	wei.
Fish	unda.	An old man	ackniritja.
Mosquito	ewinga.	An old woman ..	aragatja.

<i>English.</i>	<i>Native.</i>	<i>English.</i>	<i>Native.</i>
Head	kopita.	Bark	timba.
Eye	alkna.	Good	alljura-allmala.
Ear	alprketa.	Bad	akuna.
Mouth	rucketa.	Sweet	wurta.
Teeth	arteta.	Hungry	anunkula.
Hair of the head ..	akera, perka.	Thirsty	ankuta.
Beard	aninga.	To eat	ookooma.
Nose	eddlä.	To drink	quatchenja.
Hand	elchu.	To sleep	angunga, or anggunjela.
Tongue	alljumma.	To walk	limman.
Stomach	atnela.	To see	arrimma.
Breast	uletja.	Yesterday	mirka.
Posterior	atuungyuna.	To-day	letta.
Leg	enta.	To-morrow	aljurka.
Foot	inga.	Where are the blacks?	arrilla thimma?
Bone	gūna.	I do not know	jurruga allang- gelarda.
Blood	arigna.	Plenty	ackindja, acknar- ridja.
Skin	pulla.	Big	ackrimulla.
Fat	andara.	Little	attnetja.
Bowels	atnundurka.	Dead	alluka.
Excreta	aedna.	By-and-by	urraka.
A large spear	arilpa.	Come on	pit-chi.
Small spear	atjalta.	Creek	toola, or toorla.
Instrument for throw- ing the spear	womerah, or amura.	Wood	ooltha.
Shield	ulkudda.	A wooden water- vessel	urtua.
Stone tomahawk ..	elapa.	A rat	ootninka.
Sun	rāra.	Kangaroo rat	ooworta.
Moon	angitra.	Sandhill	alba.
Star	andulbra.	Gum tree	oomāra, alapa.
Light	elilkima.	Bush of various kinds	ootrica. oondara. erilpara.
Dark	ingna.	The mulga tree ..	artioka.
Cold	arindja.	A clay pan	ooliripa.
Heat	anginja.	Little water	atchooka.
Day	eldala.	Stony tableland ..	eekellara.
Night	angala.	Turkey	toorwa.
Fire	oora.	A short distance ..	urting jia.
Water	quatcha.	A long distance ..	urtinga.
Smoke	kurtu, rerendem.	A very long way ..	urtinga urtinga.
Sand	ealla.	House	mis mis?
Stone	apperda.	One (1)	ninta.
Wind	allurepa.	Two (2)	dramma.
Rain	ackulja.	Three (3)	eripidramma.
Thunder	ulkulta.	Four (4)	ninta eripidramma.
Grass	nanga.	Five (5)	dramma eripidram- ma.
Wood	ulta.	Plenty	acknarridga.
Camp	meringa, umara.		
Yes	beh, airatja.		
All right enough ..	kallakalla.		
No	warra.		
No	ackana.		
No	atchia.		
Me	yinga.		
You	unga, or unda.		

The following is one of the corroborrees:—

Umbranai, umbranai jib-jib acunai
Kudu kaer en kae dull by ra ru mae
Koota warran morran munae
Kutu worran win ginæ
Wan a du ping quâ wonna warraî.

The tribes are divided into four classes: Piltara, Parola, Panunga, and Gomorra. A Pittari man marries a Gomorra woman, the offspring is a Panunga; a Gomorra man marries a Piltara woman, the offspring is a Parola; a Panunga man marries a Parola woman, the offspring is a Piltara; a Parola man marries a Panunga woman, the offspring is a Gomorra.

The tribes on the Plenty and Marshall rivers have the same tribal division, except that Piltara becomes Piltarê, and so on; and the language is nearly the same, as the following words will show. I obtained these from the two girls spoken of in my journal.

<i>English.</i>	<i>Native.</i>	<i>English.</i>	<i>Native.</i>
Head	kopita.	Chin	arugid.
Eye	elguma.	Nose	ech.
Arm	upgua.	Hand	ildya.
Breasts (female) ..	oolitcha	Stomach	oonita.
Leg	labba.	Foot	inga.
Hair	ookka.		

The next tribe met with, in latitude 20° 30', south spoke quite differently.

<i>English.</i>	<i>Native.</i>	<i>English.</i>	<i>Native.</i>
Yes	youl.	Water	yûca.
Fire	menala.	Sun	uwitchera.
Moon	ikurta.	Girl	wooragara.
Boy	nintâ.	Hair of head	coola.
Eye	mingha.	Nose	oordool.
Teeth	coorgada	Ear	penalla.
Whiskers	chinunga.	Head	liya.
Arm	kadarra.	Breasts	oonoowalla.
Stomach	woodulla.	Penis	woola.
Womb	bool.	Leg	poordagga.
Foot	cheena.	Stone	pooringam.
Grass	thuam.	Spinifex (Tridonia irritans). }	chepada.
Come on	poorkapa.		

The Umbria tribe in the Anthony's Lagoon country, lat. 18° south, again speak quite differently. The native name of the lagoon is "Karkarkwedja."

<i>English.</i>	<i>Native.</i>	<i>English.</i>	<i>Native.</i>
Head	tamunga.	Stomach	turoom.
Nose	câlum.	Leg	chack.
Eye	mooloo.	Foot	changa.
Teeth	queedyun.	Fingers	moomooroo.
Whiskers	chamungdool.	Boy or young man ..	tuâ.
Chin	charndum.	Girl, small	allung.
Neck	koorangim.	" big, but a virgin	noongarin.
Arm	charloo.	Woman, young ..	koodunger.
Hand	labeera.	" old	malum malat.
Breasts	{ abooloo. grenyâl.	Old man	boomutch.
		Inodia nutans ..	boorime.

<i>English.</i>	<i>Natives.</i>	<i>English.</i>	<i>Native.</i>
Creek timber	koondadarra.	Boy, small	ullach.
Guttapercha	mungaugil.	" big	tuya.
Coolbah	chibaroo.	" circumcised ..	loo-tinga.
Plenty of trees	riarra.		
Body	winningi.	Horse	deemannä.
Sun	kamboola.	Dog	tehangä.
Moon	adungaree.	Hawk	käloom.
Morning Star	cumbungaree.	Crow	noomurmo.
Star	chingit.	Creek	illigarra.
Wind	margool.	Stone, or hill ..	kooda.
Cold	raringingen.	Plain	mimgroo.
Rain	ira.	One	chandidgi.
Hot	oolawudya.	Two	koodgarra.
No	que-ella.	Three	oorgunbulla.
Yes	esbella.	Four	{koodgarrangarra koodgarrangarra.

This tribe extends to the coast country, and the same language is spoken to the salt water, when it changes.

The natives here have twelve tribal divisions, and are rather a fine race, many of them being over six feet in height; one fellow is 6 feet 8½ inches high, and weighs 17½ stone.

Explorations and Ascents in the Caucasus in 1889.

THE following is a list of the principal ascents and expeditions made this year in the Central Caucasus. (See map, *ante*, p. 404.) Of the passes, Nos. 4 and 5 are rarely used by native hunters. The rest were crossed for the first time this summer. Mr. D. Freshfield and Captain Powell crossed all of them; Mr. C. T. Dent the first three, and Mr. Hermann Woolley the first two. Alpine guides were employed.

Passes.—1. The *Ceja Pass* from the source of the Ardon (close to the Mamisson Pass) to the Ceja Valley.

2. The *Ullu-anz Pass* (14,300 feet—Ullu-anz = great valley) from the Cherek by the Tutuin-su and over the eastern ridge of Dych-tau to Dou-mala. On this pass the last bivouac of Donkin and Fox was discovered. (See *ante*, p. 559).

3. The *Saluinan Chiran Pass* (13,622 feet—Chiran = Glacier) from the Bezingi Glacier by a hitherto unmapped glacier, the Chaour-tu, to the Gara-su and Chegem. The descent on to the névé of the Chaour-tu is by a wall of rocks 1400 feet high, raked in the afternoon by volleys of stones which fall with the velocity of bullets. Much time (seven hours) was consumed in the endeavour to avoid these, and the glacier had to be descended by lantern-light. Its prodigious moraines bear witness to the rapid disintegration of the ridges that encircle the upper snow-fields.

4. A pass from the Bashil-su to the Adyr-su (12,678 feet) parallel to that crossed last year by Fox and Donkin.

5. The Achsu Pass (13,000 feet) from the Shichildi Glacier to Betsho.

Peaks.—Mr. Hermann Woolley ascended Dych-tau* (16,923 feet 5-verst map, 16,880 feet Djukoff) from the Tutuin Glacier by a route different to that attempted by Donkin and Fox last year. He also climbed the eastern peak of Mishirgi-tau (16,100 feet) and Koruldu (about 15,000 feet), and made the first ascent from the north-east of the western peak of Elbruz crossing the gap between the two summits.

The Signori Vittorio and Erminio Sella also ascended Elbruz, and made the first ascent of Mala-tau (or Ullu-anz Bashi), 15,351 feet, and they and Mr. D. Freshfield and Capt. Powell climbed the Leila (13,300–400 feet) the isolated glacier range south of Suanetia, which is perfectly easy of access (though four native hunters taken by Prince Atar Dadish Kilian failed to reach the summit) and commands a superb panorama of the chain.

Signor V. Sella brings home over 100 photographs, and Mr. Woolley has also obtained many important and beautiful views. As both these gentlemen are among the best amateur photographers, the results of their journey, which will doubtless be seen at the Winter Exhibition of the Alpine Club, will be looked forward to with great interest.

Mr. D. Freshfield and Captain Powell, with two hunters supplied by Prince Atar Dadish Kilian, traversed the great forests between the Ingur and Kodor. This route—known in Suanetia as that “by way of Neskra and Darl” (Darl = the middle Kodor)—has fallen into disuse since the depopulation of Abkhasia. Between the Nakra valley and the junction of the Klutch† and the Kodor the track, where there is one, alternately plunges into the densest forest, and climbs over wide uplifted pastures, frequented in the summer months by a few shepherds and their flocks from the Mingrelian lowlands. There is one log hut in the Neskra valley, convenient for hunters and persons desirous of living as far as possible from a magistrate. This is the only habitation between Suanetia and Shkaltra on the Kodor, a distance of four days’ journey. The two passes, Nakra-Neskra and Neskra-Kodor, are about 9700 feet above the sea. The Neskra torrent is crossed at about 3000 feet. The ascents and descents are, for laden animals, of almost impossible steepness, and the

* Since 1887 the three great peaks of the central group of the Caucasus have been referred to constantly in these pages by the names given to them in the 5-verst map. M. Djukoff, of the Russian Survey, has recently ascertained that the Dych-tau of the 5-verst map (and, consequently, of European literature), is locally called Koshtan-tau, and he has so called it on his new map, not yet officially published. For this change there is much to be said. But M. Djukoff has further transferred the name of Dych-tau to the 5-verst Koshtan-tau. This appears a very unfortunate proposal. That peak stands quite outside the Dych-su basin, and the range called Dych-tau by the Tartars is naturally that at the head of the Dych-su Glacier. Until a new nomenclature has been definitely sanctioned by the Topographical Department at Tiflis that of the 5-verst map will be retained in these pages, with such explanation as may be needful.

† See Grove’s ‘Frosty Caucasus.’

track, often interrupted and buried amongst the huge trunks of fallen trees, is in places very difficult to follow, or even discover. The views from the heights over Suanetia, of the Kodor valley and its peaks, the main chain, and two isolated glacier groups to the south, guarding the gorge of the Ingur, are singular and beautiful. The hunter-guides lost their way, and finally, at Shkaltra on the Kodor, dismissed themselves, riding off suddenly home (without food or pay) on the Prince's mules, and leaving the travellers to procure transport from Lata, 20 miles off. Lata is a long day's ride (36 miles) from Sukhum Kaleh. A stay of two nights at Lata, where Mr. Grove's party in 1874 all caught fever, did not produce any ill results. Of the Alpine guides taken out, however, no less than three more or less seriously suffered in health in the mountains, though their symptoms were attributable rather to hard living than to climate.

In all these expeditions the natives employed invariably failed as soon as what mountaineers call difficulties began. It is to be hoped that the vulgar belief that the inhabitant of the Caucasus or the Himalayas is born a glacier guide, or is of use as a leader in high mountain exploration and ascents, will soon be exploded, or at any rate not find place in serious or scientific publications. In the present case it is needful that this limitation in the powers of Caucasians should once more be insisted on, inasmuch as it at once explains and justifies the failure of the search parties of the preceding year to approach the spot where the relics of the lost mountaineers were found. The Russian officials did all that was possible at the time with native aid. No amount of good will, without rope, ice-axes, and nailed boots, could have brought men through the icefall of the Tutuin Glacier to the fatal ridge.

Any complete account of the topographical results arrived at in this year's explorations must be deferred. A very brief summary only can be here given.

Map-makers should note that the Mamisson Pass (9400 feet) is now crossed by a carriage road, the second over the Central Caucasus, which connects Vladikafkaz and Kutais. The ascent (7350 feet) from Allagyr (2050 feet) on the north side of the pass to the summit is so gentle that there is only one zigzag. But the construction of this fine road will be so much labour thrown away unless speedy and efficient steps are taken for its maintenance and repair, and for the timely removal of the snow-drifts that are now allowed to block and rot the track near the summit.

The Adai Choch group still requires a detailed exploration before any map of it having the smallest pretensions to even general accuracy can be constructed. For this purpose Bordjula (14,083 feet) should be ascended. The two high peaks seen by Mr. D. Freshfield in 1887, from heights above the Rion basin, appear to stand at the head of the eastern *névé* of the Karagom Glacier. The northern and loftier of these two peaks (No. 1) is on the same ridge and somewhat east of the rock-peak;

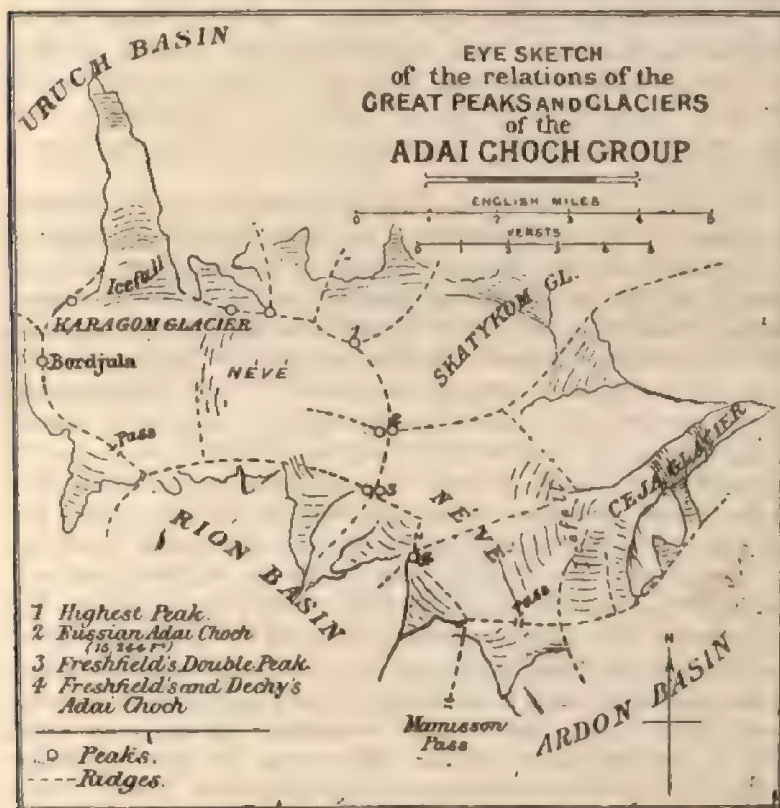
above the ice-fall of the Karagom, and probably overlooks on the other side the Skatykom Glacier. This seems to be the highest peak in the group. The second summit, first noticed by Mr. Freshfield in 1887, rises between the heads of the Ceja and Karagom Glaciers, and behind and close to the "double peak" of Mr. Freshfield's 'Central Caucasus.' This summit (No. 2) is visible from the village of Ceja, and is probably that to which the name of Adai Choch and the height of 15,244 feet were assigned by the authors of the 5-verst map. A pass may be made between peaks 1 and 2 from the Karagom Glacier, probably to the Skatykom: another pass between No. 2 and Mr. Freshfield's double peak from the Karagom to the north-western head of the Ceja Glacier. It follows that the map published with M. de Déchy's paper in the twelfth volume of the 'Alpine Journal,' together with a more pretentious map issued (with a recast of the same paper by M. de Déchy) in 'Petermann's Mitteilungen' for September last, are to a great extent inaccurate. The portions of these maps of real value are the basin of the Ceja Glacier (which M. de Déchy himself visited), and the glens of the Dargom and Skatykom, in which the ~~new~~ Russian survey has been used. The internal features of the Ceja névé are fairly indicated, but the geographical position assigned to its bounding ridges is not, we believe, accurate. The representation of the rest of the group, including the paths and glens between Kamunta and Zenaga, is copied from the 5-verst map, which is fictitious in this, as in many other districts. Through following its indications Petermann's map-maker has in this instance (as Mr. Freshfield in others) been entirely misled. The following rough diagram may make more intelligible this intricate piece of orography.

Between the Adai Choch group and the central group is a cluster of peaks dominated by a fine mountain, not yet measured, but little below 15,000 feet, called Fastak Choch in the 5-verst map. It is well seen from the Uruch valley. West of the central group and immediately above the Gara-su rises a magnificent rock pyramid 15,134 feet in height, called Tinturgu in the 5-verst map, but Tiktengue by M. Djukoff. Both these mountains so far dominate their neighbours as to be conspicuous in distant views and will in the future be counted among the great peaks of the Caucasus. They have been photographed by M. de Déchy.

In the central group the upper basin of the Tutuin Glacier has been discovered and explored, and Mr. H. Woolley has cleared up the relations of the ridges and glaciers between Dych-tau and the Dych-su Glacier, and established the existence of a large glacier north of the Dychsu and flowing from Dych-tau into it.

In the sketch-map published in June last in the 'Geographical Proceedings,' the eastern branches of the Chegem Valley are (as Mr. Freshfield suggested at the time was probable) from following the 5-verst

map, erroneously represented. The Bulungu Glacier is in reality small and unconnected with the watershed. A vast glacier, flowing parallel to the main chain, stretches from the western base of the Saluinan Chiran peak (14,700 feet) to the Gara-su, or eastern head of the Chegem Valley, and is called the Chaour-tu. The Saluinan Chiran névé is completely cut off from the snow-fields west of it by a wall of rock (the existence of which was denied by Mr. Holder; see *ante*, p. 365).



In the same sketch map the Chegem spur is very imperfectly laid down. The existence of three glacier passes over it, and the relations of its main glaciers have now been ascertained. The limestone peaks of the Jilki-su form a separate massif and there is no glacier water in that stream.

The existence of two high passes east and west of Ushba to Suanetia from the Shichildi Glacier has been established.

The northern and western valleys of the Leila chain have been visited for the first time by travellers, and a lofty glacier pass through the heart of the group used by the natives, and leading directly from

Ezeri to Lentechi, made known, together with other routes between the Leila snows and the gorge of the Ingur.

Finally, the problem of finding a practicable mountain route for travellers with luggage horses through the uninhabited and almost pathless forests to the west of Suanetia has been solved. It is believed that no traveller has passed through these forests since Mr. Spencer, fifty years ago; if, indeed, his very confused and disjointed narrative refers to the route traversed by Captain Powell and Mr. D. Freshfield.*

A new horseroad is being made between the Kodor Valley and the Teberda over the Kluchor Pass, which reduces the distances (in time), in the Kodor valley to about half those given in the 'Alpine Journal,' vol. vii. p. 103, by Mr. A. W. Moore. All the new bridges however, have been recently carried away, including one on the high road close to Sukhum Kaleh!

The information thus collected should be of some service to future travellers. But the most satisfactory and important fact connected with the exploration of the Caucasus remains to be mentioned. General Shdanoff, the Head of the Survey Department, has taken up in earnest the task of re-mapping the chain with the utmost attainable accuracy, and with all reasonable speed. This summer, Survey officers were found in Suanetia and in every valley on the north side. Their sketch-maps and memoranda were placed without reserve and with the greatest courtesy at the disposal of English mountaineers. To M. Djukoff and M. Bogdanoff special thanks are due for the assistance they afforded. It is by the Russian surveyors, concurrently with the climbers of this year, that most of the above-mentioned rectifications have been established; and it will be to them that the first precise and authentic picture of the great glaciers will be mainly due. With some little help from mountaineers with regard to inner portions of the chain (such as the *névé* of the Tutuin Glacier) invisible from any spot accessible to natives, the new Survey promises to be among the most accurate yet constructed of any snowy range, and if it be reproduced in the style of the portions privately issued last year (Elbruz and the Mishirgi Glacier) it may vie with the productions of any country in Western Europe. When the whole of the sheets depicting the Central Caucasus have been published, men of science and mountaineers will alike be astonished at the extent and complexity of a glacier system which has no rival in the Alps, and new material of great value will be at the disposal of all students of mountain structure and the numerous problems connected with it.

* See Spencer's 'Travels in Western Caucasus,' vol. i. p. 310, London, 1838.

GEOGRAPHICAL NOTES.

Our New Session.—The Evening Meetings of the Society recommence on Monday, November 11th, when a paper will be read on Cyprus by Major-General Sir Robert Biddulph, G.C.M.G., late H.M. High Commissioner of the island.

Ethiopia, Area and Population.—Under the title of "The Area and Population of Ethiopia," Professor E. Levasseur contributes to the 'Bulletin' of the International Statistical Institute a short monograph, in which he endeavours to fix the limits and areas of the various sections included under that name. Abyssinia, he points out, is neither a state nor a precise region. One of the most recent writers entitled to give an opinion on the subject, M. Antonio Cecchi, states that in its widest acceptation the name may be applied to the territory which extends northwards as far as the first cataract of the Nile, which has that river and the Blue Nile for its western boundary, and the sea for its eastern, but the boundaries of which, north and south, cannot be more exactly given for lack of precise information. M. Cecchi is supported in his opinion by all who have made a serious study of the region. In ancient times Ethiopia had an equally undefined area. Yet, vague as its limits are, according to M. Levasseur the region has a well-marked physical character. On Habenicht's map of Africa, M. Levasseur and Signor Bodio, of the Italian Statistical Bureau, have made a new estimate of the areas not only of the different regions which they consider as included in Ethiopia, but of the whole region included between the Nile and the sea, and which they have divided into eight regions. The following are the results in square miles:—1. Bogos, Tigré, Amhara, &c., to the north of the Blue Nile, or Ethiopia proper, 68,825. 2. Shoa, also included in Ethiopia, 28,830. 3. High regions to the south of Ethiopia, to Kaffa, which may be attached to Ethiopia, 73,800. Total, Ethiopia proper, 171,455. 4. Territory comprised between 33° E. long., the Nile and Blue Nile on the west, the higher Nile as limit of Ethiopia on the south, the 16th parallel from the northern extremity of Ethiopia to the coast, the coast from the 16th to the 20th parallel on the east, and the 20th parallel on the north, 154,255. 5. Region between the Blue Nile on the north, the White Nile on the west, the high region on the south of Ethiopia and the 36th degree of longitude on the east, the Equator on the south, 213,880. 6. The Galla region between the 10th parallel on the north and the Equator on the south, the boundary of regions Nos. 2 and 3 and 36° E. on the west, and the limits of Galla and Somali Lands on the east, according to Habenicht's map, 260,420. 7. Somaliland, between the Gulf of Aden, 45° E. long., 10° N. lat. (from 45° E. to the supposed Somali-Galla frontier) on the north, the Galla-Somali boundary on the west, the Equator on the south, and the Indian

Ocean on the east, 274,870. 8. Region between 16° and 10° N., limits of Nos. 1 and 2 on the west, the coast of the Red Sea and the Gulf of Aden and 45° W. long. on the east, 66,810. Grand total, 1,141,690. If the area is uncertain, the population is still more so. For Ethiopia in its wide sense M. Levasseur is inclined to estimate the population at $4\frac{1}{2}$ millions, and for the whole region comprised in his table of areas, not more than 20 millions.

The Giant's Kop in the Drakensberg Range.—Mr. H. W. Seton-Karr, who has recently returned from a hunting and exploring journey in South-eastern Africa, writes to us as follows:—"After passing through Zululand with my ox-waggon along the coast almost to St. Lucia Lake, I went a short distance inland to the country enclosed between the Black and White Umvolosi rivers. The natives were at war with us hereabouts last year, but they are now settling down under British rule, paying their taxes willingly, and even building kraals, which is always a sign of peace. Towards the end of the winter I made my way with some natives and a pack-horse to the Drakensberg range, where it culminates in Cathkin Peak and the Giant's Kop. The former exceeds 10,000 feet in height, and is, I believe, of sandstone. I discovered two large caverns or perforations drilled right through the Giant's Kop, one opening of each being on the Natal side of the mountain, and the other on the Basutoland side. They are close together, and appeared to be situated about a thousand feet below the summit. It seemed impossible to climb up to examine them from the Natal side, but the range is not so steep on the Basuto side. It forms an almost unbroken barrier for 50 or 60 miles. Standing in one spot at the base of the Giant's Kop, I could see the sky on the other side through both apertures simultaneously. It reminded me of the natural tunnel through the island of Torghætta in Norway, only here there are two. I mentioned my finding this curious formation to Sir John Robinson and several other persons at Maritzburg and Durban, but no one knew of its existence previously so far as I could ascertain. At the same place and on the same day a severe snowstorm overtook us, and I lost my horse over a steep gully. He was killed by the fall, and we had great difficulty ourselves in getting down with heavy packs upon our backs."

Lake Rudolf and its Hydrographical Connection.—The interesting and important hydrographical questions arising out of the discoveries of Count Teleki in the region lying to the N.N.E. of Victoria Nyanza, coupled with those of M. Borelli and others in the Galla country, are discussed with great clearness by Lieutenant von Höhnel, the companion of Teleki, in a short article in the current number of *Petermann's Mitteilungen*. In the September number of the 'Proceedings' (p. 560) we gave briefly the conclusions at which M. Borelli had arrived, after consultation with Teleki and Höhnel, as to the ultimate destination of

the river Omo. Some of these conclusions are supported by Von Höhncl, who has embodied the surveys of the Teleki expedition with those of Borelli, Cecchi, Schuver, Thomson, and Fischer in a map, which throws an entirely new light upon the hydrography of this region and forms a most valuable addition to the cartography of East Equatorial Africa. Lake Rudolf is described by the author as a long, narrow sheet of water, extending from $2^{\circ} 16'$ N. to $4^{\circ} 47'$ N. in an almost due north and south direction, with an area of about 3050 square miles. Its shores are mostly bare, being composed of volcanic rock or of fine sand. In some places, especially in the south-west corner, the surrounding hills slope precipitously to the water's edge, but in the middle of the western side and at the northern end of the lake the shores are quite flat. On the northern shore some reedy vegetation flourishes, while in certain spots there may be found bordering the lake a narrow stretch of an apparently tender but nevertheless stiff and pointed kind of grass of a light green colour; elsewhere grass is entirely absent, and the general aspect of the country is that of a desert. Hot, strong, sand-laden winds, making life a burden, blow almost continuously from the south-east. In the south the water of the lake, which is rich in soda but drinkable, is of a beautiful blue colour, whence its native appellation of "Basso Narók" (i. e. black, blue, or dark lake), but on the north it is yellow and muddy. This is due to the floods which during the rainy season submerge a large tract of country at this end of the lake, where the two principal tributary rivers empty themselves. The lake is at the present time quickly extending towards the north; the level of its waters has apparently changed at frequent intervals, and it is impossible to say whether the volume of water is increasing or diminishing. In the south-west the lake receives two considerable streams, the Irrguéll and the Kerio; the former rises in the Suk Mountains, while the latter comes from Elgejo. It is, however, only in the short rainy season (March and April) that these streams bring any water to the lake, during the rest of the year their lower courses are quite dry, although in places water can be reached by digging. The two large rivers, the Bass and the Niam-Niam, discharging their waters at the north end, are on the other hand perennial in their flow. Only the latter and more easterly of these rivers was visited by the traveller, but the information obtained as to the lower course of the other he regards as thoroughly reliable. The Niam-Niam is about 100 yards in breadth and of unascertained depth, with a current estimated at a little over one mile per hour. Its waters at the rainy season were dark brown in colour, and contained an extraordinary quantity of dark earth. The banks are lined with a luxuriant and dense growth of fine trees. The Bass, which in its lower course runs close and almost parallel to the Niam-Niam, appears to be very broad ($1\frac{1}{4}$ mile), shallow, and almost without a current. From personal observation corroborated by native information, Von Höhncl is able

say that Lake Rudolf has no outlet. Lake 'Stephanie' ("Basso Ebór" or white lake), lying a few miles to the north-east, is also a self-contained reservoir; it is about one-eighth of the size of Lake Rudolf, but is rapidly drying up. That the Niam-Niam is identical with Borelli's Omo, Von Höhnel regards as conclusively proved. From native information collected on the spot he was able to fix its lower course for about 45 miles, leaving it flowing from the north-east or east at a point about 30 miles from the 6th parallel of latitude. Borelli followed the Omo down to $6^{\circ} 20'$, whence he gives it a westerly direction along the 6th parallel for about 135 miles, and then a southerly turn, emptying itself into a lake called Shambara or Shamburu. A glance at the map shows that the Niam Niam and Omo must therefore be one and the same river. Captain Cecchi, formerly a champion of the Omo-Djubb theory, now supports Von Höhnel. On the other hand, Borelli's Lake Shambara, regarded by that traveller as identical with Lake Rudolf, Von Höhnel places further north at the intersection of the line of 36° long. and the 6th parallel of lat., and makes the Omo-Niam-Niam flow through the lake. His reasons are that the description of Shambara given by Borelli does not accord with that of Lake Rudolf; the people stated to be living round its shores are evidently not those found inhabiting the northern end of Lake Rudolf; Shambara was stated to have an outlet at the south-west, whereas Rudolf has none; further, Von Höhnel, coming from the south, never heard any of the natives speak of a lake "Samburu" or "Shamburu," they all agree in calling Lake Rudolf Basso Narók. Another interesting hydrographical question, viz. the possibility of a connection between Lake Rudolf and the Nile basin, is also discussed by him. That such a connection cannot in his opinion exist he demonstrates as follows:—The altitude of Lake Rudolf above the sea, as shown by sixteen carefully calculated observations, is 1548 feet; the Nile at Lado (same parallel as Lake Rudolf) is 1525 feet above the sea, and in its northward course to Khartum, 1240 miles distant, falls only 262 feet. In this part of its course the Nile receives the Sobat at a point 1378 feet above sea-level; thus, supposing the Sobat to issue from Lake Rudolf, its fall would be only 170 feet along a course of say 1150 miles. But Dr. Junker, who in 1876 ascended the Sobat as far as Nasser, reckons the stream to flow at the rate of $2\frac{1}{2}$ miles an hour, and the fall for this short distance (185 miles) has been calculated at more than 170 feet, so that there can be no connection by this means between Lake Rudolf and the Nile. It may perhaps be added here that no member of Teleki's expedition actually visited the western shores of the lake. A further point deduced by Von Höhnel from these considerations of relative altitudes is, that Schuwer's Lake Haarlem, which lies on the border of the Abyssinian highlands some miles east of Nasser and at a greater altitude than the latter because the Sobat receives affluents from the north-east and east, is the lake-source

of the river Bass, which would therefore flow down southwards to Lake Rudolf. Cecchi, from native information, supposed a river Baro flowing from the south into Lake Haarlem, while Schuver mentions another river Baro coming from the highland to the north-east and forming Lake Haarlem. Von Hohnel sees in this river and in Cecchi's Baro the middle and upper course of the Bass river. The names Baro, Bass, Boo, and Ban, have the same significance.

Indian Marine Surveys, 1888-89.—Commander A. Carpenter, R.N., has submitted a very interesting report on the operations of the Indian Marine Survey for the year 1888-89. At the close of the previous working season the officers of the *Investigator* surveying steamer and No. 1 boat party were preparing for the recess at Poona, and during that time the following charts were drafted :—

Name.	Scale.
*Port Blair to Sisters Islands	1 inch to 1 mile.
North Sentinel Island	1 " "
*Port Blair	5 " "
Macpherson's Strait	2 " "
West Coral Bank	1 " "
Middle and South Coral Banks	1 " "
Porbandar Harbour	20 " "
*Porbandar and Naribandar	4 " "
*Cannanore to Mahe	1½ " "
*Plans of Cannanore and Tellicheeri	3 " "

Sailing directions for the Andamans, coasts of Malabar and Kathiawar, and tidal data were also prepared.—The cold season's work comprised *inter alia* surveys of South Sentinel Island, of the shoal off the south-west point of Little Andaman, of the Devi river entrance, Sacramento Shoal (unfinished at date of report), and Orissa coast. The latter was the most important, and comprised in all 1292 square miles of soundings on the one-inch scale. It was rapidly carried out, thanks to the marks erected by the Great Trigonometrical Survey, which, though found at times to have been thrown down or washed away, were nevertheless numerous enough to afford a valuable check to the work of the Marine Surveyors.—A valuable memorandum has been compiled by Commander Carpenter, enumerating in order the various ports and anchorages along the coasts of India, which require further examination, from the mouths of the Indus, on the west, right round the peninsula of India to the Bay of Bengal to the Pakchan estuary on the east. A comparison of these, in order of precedence, with the estimated duration of each marked opposite, shows that, with the present marine survey element, about forty years must elapse before the coasts of India and Burma can be surveyed sufficiently for safe navigation. By the time, too, British India may have extended its seaboard, on

* Photoscinoographed locally.

have largely developed, and ports not now noticed may take a more prominent place and require larger surveys, so that the completion of all Indian marine survey requirements is still very far distant.

Experiments with Economic Plants in Malacca.—Some interesting information is contained in a Report (No. 65) recently issued from the Foreign Office, as to the results of experiments with economic plants made by the Forest Department in Malacca. We extract the following:—Mauritius hemp (*Fourcroya gigantea*) grows slowly, but well; some fibre has been prepared from a few old plants and has the appearance of good fibre. If kept free from weeds, nothing further appears to be required to ensure success. Virginian tobacco—a fine lot of plants were raised from seeds received from Kew, but from seeds saved locally the plants deteriorated so much that cultivation has been discontinued; experiments with Deli tobacco were also unsuccessful. Castor-oil seeds were obtained from the Botanic Gardens at Calcutta, and the plants have grown vigorously and commenced to fruit. Croton oil grows freely and fruits abundantly. Annatto (*Bixa orellana*) grows vigorously and is deserving of trial on a large scale. Black pepper grows well, and might be more extensively cultivated to advantage. The cultivation of pepper was, in the early days of the settlement, one of the chief industries of the country; it is now being taken up again to a considerable extent. Cubebs (*Piper cubeba*) promise well, and are being propagated as largely as possible. Maltese oranges and lemons have grown well. Mahogany (*Swietenia mahogani*) seeds were received from Kew in 1886; the plants have flourished and are ten feet high this year. Unfortunately few are free from the ravages of ants. Two species of Eucalypti have grown with remarkable vigour. The average annual rainfall of the district is 74 inches.

The Indian Expeditions against the Lushais and Chins.—The dual expeditions now being prepared in India from Chittagong and Upper Burma are designed to converge upon the Lushai and Chin country, which includes the region lying about the water-parting of the streams flowing into the Bay of Bengal and those belonging to the basin of the Irawadi. The best map of the country is that prepared by the Surveyor-General of India, of the "Lushai and adjoining hill tracts," on the scale of 8 miles to the inch, compiled from the 8-mile map of a portion of the Eastern Frontier of Bengal, published in 1873, with additions received from Major Hobday and the Quartermaster-General's Department in 1888. This map embraces the Chindwin river on the east, and Chittagong and the Bay of Bengal on the west, and shows Tokhlaing or Fort White, from which the northern Burmese column will operate, as well as Gangaw on the Myit-tha river, from which the southern column will advance towards Haka and Lungleh. Colonel Woodthorpe's map of the Upper Chindwin river, in the 'Proceedings' for last April, is not quite

so convenient, embracing as it does the region lying to the eastward, although there is a great deal of interesting information in the accompanying letterpress relative to the Chins and the neighbouring tribes, whose marauding depredations are the cause of the present military operations. No announcement has been made so far of any Survey officers to accompany the forces, but it is almost certain that some surveyors will be deputed to accompany the various columns, for in the valley of the Koladyne river, and on both sides of the water-parting dividing its basin from that of the Irawadi, there is a great deal of topographical work to be done, while the great importance of improving communications between Chittagong and the Upper Irawadi necessitates a thorough examination of the intervening mountains.

Explorations in Spitzbergen.—Two travellers, Dr. W. Kükenthal and Dr. A. Walter, members of the Bremen Geographical Society, have this year visited King Charles Land and the west coast of Spitzbergen. On the 2nd May last they set sail from Tromsø in the Norwegian yacht *Berentine*, but suffered shipwreck on the 11th June in Deevie Bay. The outfit of the expedition was fortunately saved, and they started again northwards in the vessel *Cecilie Malene*. Proceeding through Olga Strait and Hinlopen Strait, they reached the north-west of West Spitzbergen. Their surveys there confirm those of the German Arctic expedition of 1868. In the case of King Charles Land, however, along which they coasted several times, existing maps are quite inaccurate. The country consists of two, apparently even three, islands, which extend from 26° 20' to 30° E. long., and from 78° 30' to 78° 57' N. lat., and is of much smaller area than would appear from the surveys of the Norwegian whalers of 1872. According to the longitude just given the east coast should be set back eight degrees (about 110 miles) westwards. Throughout the voyage the condition of the ice was favourable.

Death of Mr. John Ball, F.R.S.—The Society has lost one of its most distinguished Members by the death of Mr. John Ball, which event happened at his London residence on the 21st of October. We hope to be able to give an account of his life and services to Geographical Science in our next number.

CORRESPONDENCE.

ATHERTON GRANGE, WIMBLEDON.

October 14th, 1889.

SIR,—If you will allow me to do so, I will reply as briefly as possible to the letter of Professor George Davidson (President of the Geographical Society of the Pacific), dated from the "Sub-Office, United States Coast and Geodetic Survey, San Francisco, California, August 6th, 1889," on p. 611 of the 'Proceedings' of the Royal Geographical Society for October last. I quite acknowledge the courteous tone in which it

is couched, as well as the satisfactory character of the explanations—or rather corrections—which he gives. Although Professor Davidson may have found errors in my case as I stated it, the fact remains that Mount St. Elias may turn out to be in Canadian territory after all.

My object was simply to repeat what Mr. Dall had already admitted to you in his letter in the 'Proceedings,' vol. ix. July 1887, and dated "Department of the Interior, U.S. Geological Survey, Washington, D.C., May 25th, 1887," namely (to make use of his own words), that not only has the shore-line of this part of the Pacific coast never been correctly located, but also that the position given by the Coast Survey to Mount St. Elias may possibly be two or three miles out, and that if some of our Alpine climbers should be the first to tread its virgin snows (of the summit), and decide the point in favour of the mother country, American geographers will not grudge the victory.

I was careful merely to express my belief that the observations in 1874 were the only ones taken by the United States Coast Survey as to the position of Mount St. Elias. Whether there were any subsequent ones Professor Davidson does not say. I have reason, however, for supposing that some were made by Commodore Nicholls which had no connection with the latitude and longitude of the peak.

My personal interest in the mountain, as a member of the pioneer expedition, is due to the fact of its being the highest known peak in North America, rising almost sheer from the ocean, and the centre of possibly unparalleled glacial phenomena.

I cannot recollect Professor Davidson's having given me a copy of his work, though I have often wished for one since. It might be interesting to note that the mean of the positions for the peak as given by Captain George Vancouver, the Russian Hydrographic Chart 1378, Tebenkoff (two latitudes), von Buch (Canarien Inseln), and the English Admiralty Chart 2172, is lat. $60^{\circ} 20' 21''$, and long. $140^{\circ} 33' 00''$. Those given by the United States are lat. $60^{\circ} 20' 45''$, and long. $141^{\circ} 00' 12''$.

Yours obediently,

HEYWOOD W. SETON-KARR.

The Assist.-Secretary R.G.S.

Obituary.

The late Mr. W. W. M'Nair.—Colonel T. H. Holdich, R.E., sends us from India the following additional details regarding the career of Mr. M'Nair, briefly noticed in our last issue.

Amongst the many practical geographers who have passed away during the year 1889 is Mr. W. M'Nair, of the Indian Survey Department. His career was very closely connected with a new phase of military exploration carried out on the frontier of India, which had gradually superseded the older forms of reconnaissance, and was rendered possible by late improvements in the smaller classes of instruments, and a wider knowledge of the use of the plane-table. For about ten years previous to the Afghan War of 1879, M'Nair was attached to the topographical branch of the Indian Survey, and he had always shown a special aptitude for that class of work, which consists in acquiring a comprehensive grasp of a wide field of geographical detail in the shortest possible space of time. When war broke out, Afghanistan no longer afforded a field for such simple geographical exploration as had already been accomplished during the campaign of 1839-43. A complete military survey of all important districts was required, which would furnish detailed

information of routes and passes which were far removed from the beaten tracks of previous armies. At the same time the conditions under which such a survey was to be made were exactly the same as those under which the rough reconnaissances of the former campaigns were obtained. The surveyor was under the same urgent restrictions, both as to time and as to the limits of his own movements off the direct line of march. M'Nair, with one or two others, was selected for this topographical duty with the Afghan field force, and right good use he made of his opportunities. He was present during the fighting which took place before Kabul in the winter of 1879-80, and was shut up with the garrison of Sherpur during the fortnight's siege. His energy and determination carried him through the campaign with more than credit—he was able to illustrate modern methods of field topography in a manner which threw new light on what was then but a tentative and undeveloped system. He was one of the first to prove the full value of the plane-table in such work as this, for it must be remembered that he was working in a country peculiarly favourable to the application of a system of graphic triangulation, and very different to the densely forest-clad mountains of the eastern frontier into which the plane-table had been carried before, with advancing brigades. At the close of the war, which brought no recognition of his exceptional services, he was appointed to the Kohát survey party, which was primarily raised for the mapping of the Kohát district, but which afforded occasional opportunities for extending topography across the border. When this party was first raised our frontier maps were of the most elementary character; there was many a blank in the topography of the lower borderland, and geographical darkness shrouded nearly the whole line of frontier mountains. The hostility of the border people had always been such that it was a matter of considerable risk to approach them, but the temper of the tribes was then rapidly changing with the times, and M'Nair rapidly succeeded in establishing himself on a friendly footing with frontier robber chiefs, whose assistance was invaluable in arranging short excursions across the line, by means of which he was able to complete a fairly accurate map of most of the border country. No work that ever he accomplished has been of more value to the Government of India than this unobtrusive frontier mapping. It was whilst he was thus occupied between Peshawur and Dera Ismail Khan that he made the acquaintance of certain influential men of the Kakar Khel, who offered to see him safely through the dangerous districts outlying Kaffirstan, and give him the opportunity of being the first European to set his foot in that land of romance. The snow-capped summits of some of the more southerly peaks of Kaffirstan had been seen and fixed by M'Nair during the progress of the Afghan campaign, and it had ever been a dream with him to reach those mighty spurs, and turn those peaks to account by using them as the basis of a topographical map of the country. He did reach them, as the records of the Royal Geographical Society sufficiently show, and he may fairly claim to be the first Englishman to lift even a corner of the veil of mystery which has ever shrouded that inaccessible country so far as its topographical conformation is concerned. This excursion won for him the Murchison Grant of the Society, and established his position as a leading practical geographer.

For the last few years of his life M'Nair had been almost incessantly occupied in the rough work of frontier surveying, which his knowledge of frontier people and power of winning their confidence and help especially fitted him to undertake. At the time of his death he was employed in the Baluchistan Survey party in the completion of a triangulation series which should carry the great Indian system to the Kojak range, and furnish a scientific and highly accurate base for future extension into Afghanistan. This was a duty which severely taxed even his vigorous constitution. It involved incessant labour in examining lofty mountain peaks in order

to select suitable sites for stations, and subsequently days and nights of arduous watching during the progress of the observations, whilst food and water (when snow was not lying on the ground) were scarce, and mists and clouds hung round the mountains. No doubt it tried him hard, and when typhoid attacked him at Quetta he seemed unable to make a good fight for his life. He was able, however, to reach Muzazzir, where he died on the 13th August, leaving a gap in the Department which he served so well that it will be exceedingly hard to fill.

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION.

NEWCASTLE-UPON-TYNE MEETING, 1889.

(Concluded from p. 630.)

Friday, September 13th.

On the Great Central Asian Trade Route from Peking to Kulja and Semirechensk, and to Yarkand and India. By Colonel MARK S. BELL, V.C., R.E. Will be published in a subsequent number of the 'Proceedings R.G.S.'

The Central Asian Railway in relation to the Commercial Rivalry of England and Russia. By the Hon. G. CORZON, M.P.—The substance of this paper, containing all that is of special Geographical interest, has already appeared in the 'Proceedings' for May last, *ante*, p. 273.

On Wind Action in Egypt. By W. J. FLINDERS PETRIE.—Given in full in the present number of the 'Proceedings,' p. 646.

Lake Tanganyika. By Captain EDWARD C. HORE.—This paper was published in full in the October number of the 'Proceedings.'

Recent Portuguese Explorations in Africa. By J. BATALHA-REIS, F.R.G.S.—From the fifteenth century to the present time the Portuguese have not ceased to explore those parts of Africa where they settled, causing the continent to be traversed from the coast to the interior, and from the Atlantic to the Indian Ocean. But outside Portugal the greater part of the Portuguese explorations of the nineteenth century are entirely unknown. Many geographers and the public in general believe, and repeat daily, that Portugal has done nothing in Africa since the sixteenth century, and that even then her travellers explored only the African coast. As ignorance regarding this chapter of geographical history is the origin of many and great mistakes in modern questions which are linked with politics and international right, and with which public opinion is so intensely preoccupied just now, the author judged it to be opportune to present an indication of the principal Portuguese explorations, at least, from the beginning of the nineteenth century, with the mention of the principal documents wherein the little-known literature of the subject may be studied.

The chief Portuguese explorations of this century commence with its earliest years. In 1802 the expedition sent out by Colonel Honorato da Costa from Angola, which traversed the whole of the continent from the basin of the ~~Kasai~~ to the of the Lualaba, Luapula, Bangweolo-Bemba, and N. 1811. In 1804 and 1805 Father Cannecatin pub upon the Bunda, or Angolense, language, and the In 1831-32 Monteiro and Gamitto explored the r

Bangweolo, and Moero and the river Zambezi. In 1838-48 Major Francisco J. Coimbra made his journey from Mozambique to Benguela, across Africa, and visited the lakes to the north of Kalahari. In 1843-47 Joaquim Rodrigues Graça went from Golungo to Bihé, and thence to Lunda, almost at the eastern extremity of the basin of the Kassai. For many years Silva Porto travelled and explored the territories between the valley of the Kwanza and that of Liamba on the Upper Zambezi. In 1852-56 his expeditions travelled from the Upper Zambezi to the Upper Luangua, and between the basins of the Zambezi and of the Congo, passed to the south of Nyassa, and crossed diagonally the region between the Nyassa, the Rovuma, and the sea. In 1855-56 Montanha and Teixeira explored the territories between Inhambane, the Limpopo, and the north of the Transvaal. In 1877 expeditions of engineers were sent by the Portuguese Government to all their colonial provinces of Africa, and instituted the investigations and works which have gone on up to now, and from which the first railways in these regions had their commencement, the more perfect knowledge of many of the regions being also due thereto. In 1877-78 Serpa Pinto crossed the continent of Africa from Benguela to Bihé, and thence, by the affluents of the Kwando, to the Upper Zambezi, thence to the lakes north of Kalahari, thence through Bechuanaland to the Transvaal and Natal. In 1877-80 Capello and Ivens went from the valley of the Cunene to the valley of the Kwanza, and thence to that of the Kwango, which they investigated nearly as far as lat. 6° S. In 1883 Antonio Cardoso visited the districts which lie between the river Save and the upper valleys of the river Buzi. From 1880 Paiva d'Andrade has been exploring the lands which lie between the Zambezi and the valleys of the Save and Buzi. In 1884-85 Capello and Ivens travelled right across Africa, from Mossamedes to the rivers Cunene, Cubango, Liamba, Lualaba, Luapula, Lake Bomba, and thence to the Zambezi, from near the mouth of the Kafue to the sea. In 1885-86 Augusto Cardoso traversed from Ibo to the Nyassa, and thence by the Shire to the Zambezi. In 1884-88 Henrique de Carvalho and Sisenando Marques investigated the territories between the Kwanza and the Kassai, in the districts of Lunda.

These are the better known travels, but the Portuguese have undertaken very many less extensive but more minute explorations than these, which are almost entirely unrecognised, and cannot be mentioned in a brief abstract; they have thus covered with a work of uninterrupted investigation, from the sixteenth century up to the present time, almost all the more important regions of Africa which can be found between a line drawn from the mouth of the Congo to that of the Rovuma, and from that of the Cunene to the south of that of the Limpopo. Many explorations, exclusively scientific, more limited, and more delayed in their results, have been and still continue to be carried on. It was under the Portuguese Government that Welwitsch made his investigations and botanical collections in Angola (1853-60), which are amongst the principal bases of all that has been published on the Tropical African flora. In 1864-65 Pinheiro Baiso collected important zoological specimens in the districts between the Lucala and the Bengo in Eastern Africa, as did the two missionaries, Father Antunes in Huilla, and Father Barrozo in the Congo district. From 1864 José d'Anchieta has resided in the interior of Africa, and thence has sent the notable investigations and magnificent collections, for the most part zoological, which enrich the Natural History Museum of Lisbon (Eschola Polytechnica), and which, in part, have been studied by Professors Bocage (reptiles, birds, mammalia), J. A. de Almeida (fishes), F. de Capello, Guimarens, Osorio (fishes and crustacea), M. Paulino de Oliveira, A. Girard (insects), Count ... other than the principal Portuguese savants. results of some recent geological ... together with those of

L. Malheiro (1883), and other travellers, the investigations of Delgado, Choffat, and other geologists of the Lisbon Geological Commission have been founded.

The principal and less-known sources of information regarding recent Portuguese explorations are:—'Boletim e annaes do Conselho Ultramarino, Annaes maritimos e coloniaes'; 'Annaes da Marinha Portuguesa'; 'Boletins officiaes da Provincia de Angola'; 'Boletins officiaes da Provincia de Mozambique'; 'Boletins [and other publications] da Sociedade de Geographia de Lisboa'; 'Jornal das Sciencias Mathematicas e Naturaes da Academia das Sciencias de Lisboa'; 'Boletim [and other publications] da Commissão dos Trabalhos geologicos de Portugal'; 'Memorias estatisticas das Colonias Portuguezes,' by Botelho, Lopes Lima, Bordalo; 'As Colonias Portuguezas,' &c.

Nyassa-land and its Commercial Possibilities. By Captain F. D. LUGARD, 9th Regiment.—The rapidity with which the geography of Africa—the New World of the nineteenth century—has been opened up to the knowledge of western civilisation, during the last forty years, has left very little to be filled in on our charts of the "Dark Continent." As a natural sequence to the delineation of the strictly geographic features of the country comes the desire to know something of its climate, products, inhabitants, and resources. Added to the ever-increasing pressure, caused by the increase in population, is that love of adventure which marks us as a nation, and leads the upper classes to speculate in travel and the lower in emigration. Is Africa a suitable field for immigration? Does its vast area produce such articles as European civilisation requires? Will its peoples and tribes buy our calicoes and manufactures; and have they anything to offer us in return? These are the questions which have usurped the place of the vague wonder as to what lay in the unknown interior. We are concerned only with one comparatively small portion of this vast continent, and we deprecate criticism, *ab initio*, by saying that even of this portion we must speak largely by inference, analogy, and report.

By "Nyassa-land" we include that country discovered by Livingstone, and the scene of his last wanderings and death. Roughly speaking, it is bounded on the north by the southern shores of Tanganyika, and the borders of the Congo Free State; on the west by Lakes Bangweolo and Moero, and the Congo Free State; on the south by the Zambezi; and on the east by the Shiré river, Lakes Shirwa, Nyassa, and Leopold.

Nyassa-land has during the last year and a half come prominently into notice. Certain influential exponents of British thought and feeling have taken up once more the question of the slave-trade. The consensus of evidence of men so different in character and thought as Livingstone, Lavigerie, Cameron, Elton, Stanley, and Johnston, is not to be gainsaid, and British national feeling has once more proved itself on the side of the oppressed. It was generally agreed that Nyassa was one of the centres of the slave trade. It had been moreover for many years the sphere of perhaps the strongest missionary effort in all Central Africa. Here for over twenty years the Universities' Mission had worked, and spent many thousands of pounds and many noble lives. Here for the last fourteen years the Scotch Churches had been working with untiring zeal, founding some dozen stations; and closely following on these a trading company, in its origin largely philanthropic, and founded at first as a lay Mission Society, had established trading centres along all the area occupied by the missions; while even private philanthropy had expended large sums in the construction of the "Stevenson" road, between Tanganyika and Nyassa. No wonder that those interested in the suppression of the slave trade turned their attention to Nyassa-land, discovered and exploited by British, and the centre of so many, and such successful efforts by our countrymen for its good. By a strange coincidence, at the moment that the question of Nyassa

began to assume such prominence, as a centre of the slave trade, and on account of the action of Portugal towards our missionaries and traders, and their hardly concealed threats of annexation—at this same time a new prominence was given to the country by the news that the slave-traders had attacked one of the trading stations on the lake, and that British were fighting for their lives. The history of that siege, of which Consul O'Neill was the hero, reads like a page of fiction. Six white men holding their own against an army of Arabs, utterly cut off from assistance, voluntarily remaining rather than haul down the British flag, slowly firing their last rounds of ammunition one by one! Had that story been told as was the story of Rorke's Drift, England would be aware that she had six new heroes.

It is our firm belief that for a country to be developed and civilised, any scheme set on foot must have a sound commercial and practical basis. This is the keynote of Sir John Kirk's creed, than whom no man has been more practically successful in Africa.

What then are the inducements offering for commercial enterprise in Nyassa-land? Let us first view it from the standpoint we have already taken, the development of what has been already initiated in the past. The carrying trade for the missions alone is sufficient, in our opinion, to pay dividends to a small company. Undoubtedly the route to Central Africa, the quickest, far the cheapest, the easiest, and healthiest, is by the waterway of the Zambezi, Shiré, and Nyassa to Tanganyika. All the necessary supplies for the missions along this route, together with calico for their payments, should pass through the hands of the company on Nyassa, including the supplies of food and calico for those settled immediately around Tanganyika both in the Congo Free State on the west, and the numerous Arab settlements on the east. For around each mission station there grows up rapidly a desire for some of the rudimentary necessities of civilisation. The ideas of decency and of cleanliness are encouraged by mission settlements, and thus the two first wants of calico and soap are rapidly developed. These, together with salt, a chronic savage want, and metal wire and beads for personal adornment, are essentially the pioneering elements, and indeed constitute the money of the country, for which the natives are willing, not only to bring their produce, but to work by the week or month. These things, too, are largely required by the Arabs, and to a less degree by their followers, and as they can be imported to the north of Nyassa at just about half the price which the Arabs can bring them for, a large trade might be done with these people, who are keen traders, and only too ready to see on which side their interest lies; while if such commodities were supplied to them at the lowest prices compatible with small profit, the great extension of our trade would amply, we believe, cover the loss consequent on the reduction of present prices, while the prosecution of trade relations would tend to bring about a closer connection between them and the white men, and so to disarm the present feeling of mistrust and hostility. In return for these articles we should get:—

(a) From the Native chiefs:—(1) The entrée into the country with ready permission to settle near them, and so to exploit and develop the mineral wealth of the country; (2) in actual payment, ivory and such other local products as we shall speak of hereafter.

(b) From the Arabs:—(1) We hope toleration; for we must ever bear in mind that at starting we should be utterly unable to cope with the united Arab power in these regions; (2) in actual payment, ivory, of which the Arabs are by far the best collectors.

(c) From the people themselves we shall get manual labour, porters for transport, and some minor products. The two former are the great desideratum for exploiting the country, or working its minerals.

In this way the existence of the missions is a direct encouragement to trade. We have said that there is a constantly growing demand for calico and other trade goods. Let us as briefly as possible see what the country has to give us in return. One thing only, in our opinion, will pay for the initial expense of exploitation, and the subsequent heavy transit expenses, and that is mineral wealth. We know for certain now that gold exists close to the lake shore. Years and years ago, alluvial gold, and also copper, were brought by the natives from Katanga. There is very good reason to believe that the gold-bearing quartz reefs south of the Zambezi extend probably from south-west to north-east, through this district towards Moero and Katanga. Asbestos has been found on the north-west shore, coal on the east, while iron and copper are worked by the natives themselves. We have then very fair grounds for believing that this country will repay by its mineral wealth the initial cost of exploitation. Its other products are in a sense valuable, but would not, in our own opinion, ever of themselves alone pay dividends to a large company. Of these at present the most important is ivory. But by far the greater part which finds its way from the interior is "dead ivory," i. e. tusks which have been kept for years, possibly for centuries, by chiefs in the far interior who were ignorant of its value, and used it as ornamental door-posts, &c., and who now part with it to the Arab traders who have penetrated to their lands, in exchange for trade goods. This is, *ipso facto*, a decreasing product. And no less so, we think, is the "green," or newly killed ivory. Where only a year before large herds of elephants were to be met with daily, the writer has wearily followed tracks day by day without seeing a single elephant. The importation of guns and powder is responsible for this sad destruction. Native hunters shoot down remorselessly, not merely cows, but calves of any age, content to slaughter the latter to gorge on their flesh, if they have no tusks to extract, while the unfortunate fact that the African cow elephant carries tusks, renders her even in the eyes of European sportsmen a legitimate prey, and the enhanced value of cow-ivory compensates for the lesser weight of her tusks as compared with the bull. Once more we would urge that the utmost endeavour be made to check this reckless slaughter. The writer has had charge of close on sixty Government elephants in India, for some considerable time, and again in Burma, and may therefore claim perhaps to speak from some personal experience of the great services this animal, when domesticated, is capable of rendering. In a country where the horse, the ass, and the bullock—the two former imported at almost prohibitive expense—are all subject to destruction by the tsetse fly, as well as the numerous diseases peculiar to a tropical country, the elephant, if domesticated, would be simply invaluable as a transport animal.

Second only, indeed, to the discovery of a payable export is an efficient means of transport, to replace the slave labour of the Arabs, and the expensive and unsatisfactory portage which the white man has at present to employ. Of other products which, after development, would form payable exports, the most important is perhaps coffee. The coffee shrub is, we believe, indigenous on the Zambezi. On the Shiré highlands it has been cultivated with the greatest success both by Messrs. Buchanan at Lomba, the Lakes Company at Mandala, and the Mission at Blautyre. At these places very large areas are now planted with fine healthy coffee shrubs, bearing well. Tea, we believe, has been lately experimented with, but so far we are unable to say with what result, though from the analogy of India we should predict a success. Cloves and cinchona bark should also do well. All these being of small bulk in comparison to their value, should be lucrative articles of export, and should grow equally well on the highlands between Nyassa and Tanganyika on the north, and Bangweolo and Moero on the west. From the lowlands we may add rubber as a payable export. Several kinds of rubber-vine grow profusely at the north of the lake. At present this trade is completely untouched.

In addition to these primary products, which need time for their development, there are a large number of minor ones, which, though we think that they would not in themselves offer adequate returns for money invested, would nevertheless materially lessen the initial expenses. The conveyance of European supplies, porters, arms and ammunition, building and other material to the north of the lake (at which place we would advocate a considerable depot), together with the ordinary Mission carrying trade, will necessitate the steamers going northwards with full cargoes. On their return journeys they could be loaded with some of the secondary, less valuable, and more bulky products which we are about to enumerate.

But, in our opinion, most of these are more valuable for local use and manufacture than for export, and by means of such an application of indigenous products, the cost of stations in the interior might be largely reduced by the reduction of European supplies at present necessarily imported. A favourable instance of such is the Misanguti tree. This most picturesque of trees produces an incredible number of fig-shaped fruit-pods, each of which contains from four to six scarlet beans, and each bean is saturated with oil. They are used by the natives for food, and the oil, too, is extracted by boiling. When cool, this oil or fat is solid, even at a tolerably high temperature, and has the appearance of bees'-wax; it burns well as a night-light, and mixed with bees'-wax (an easily obtainable local product) would have sufficient consistency to make candles, and thus save one article of present import. We believe also that it would make excellent soap; and it is not expecting much to assume that the potash and alkalis for this manufacture could be locally found. A certain quantity, indeed, could be obtained from the large quantities of wood ash produced by the steamer fuel. This would not only save the import of soap for consumption, but might even supply one of the staple articles of barter. The Misanguti, moreover, supplies from its bark a capital mahogany dye, and from the fact that the natives use it to dye their fishing nets, and from the oily properties of the tree, it is presumable that it has very highly preservative properties. The wood of this tree is hard and valuable, and, as far as we could judge, its presence and shade was not injurious to vegetation, so that it might be largely cultivated in areas devoted to cereal crops. Lastly, we would suggest the experiment of an oil-cake made from its beans as a food for cattle and asses.

Another product of the country, at present almost wholly neglected, is hides. The Wa-Mambwa, Wa-nkande, and Angoni tribes possess enormous herds of cattle, and, except for the making of war-shields, the hides of these are little used. The hide of the buffalo, of which there are thousands in the plains at the north of the lake, being too heavy for this purpose, are entirely wasted. The great bulk of raw hides prohibits their export on the present small steamer, and would at any time be a serious detraction from their value as an export at such a distance from the coast. To obviate this we would advocate the formation of crude tanning pits, with the object of removing such portions as are unnecessary, and of softening the hides sufficiently to make them packable into a smaller bulk. One of the commonest trees in that district is the thorny acacia, called in India the Babul, in which country its roots and bark are largely used for tanning purposes. The forest, too, abounds with astringent fruits and berries—such as the Owlah (dear to sportsmen!)—and others, of whose names we are ignorant. The collection and preparation of these hides would afford employment to those in inland stations, and these semi-tanned hides would largely assist in meeting local necessities, such as camp-beds, tenting, or taking, in fact to some extent, the place of waterproof sheeting. There are, moreover, many kinds of oil-seeds (such as the ground-nuts, &c.), and of dyes, which would supply the return cargo for steamers. Of other European necessities sugar is already manufactured at Lomba by Messrs. Buchanan, and its quality is

improving yearly. Wheat, linseed, flax, cotton, and perhaps indigo, we think, could be grown on the highlands, and a fair substitute can be made for wheat-flour from the local grains. Of tea and coffee we have already spoken. Opium has been successfully cultivated at Mopea on the Kwakwa for many years, and under Mr. Addison's energetic management and improved methods the Company has lately renewed its vitality. Butter and cheese can be made for local consumption in the cattle-producing districts. At present these European necessities are imported. Another valuable secondary product is fibre. From the coir fibre of the *Borassus* palm, to the soft down of the cotton-tree, the land produces endless fibre.

Acres, nay forests, of plantain surround every Nkonde village, and the plantain fibre rots on the ground. From this, and from the bark of various trees, the natives are very clever at making rope of every size, from twine to a cable, which they call *matusi*, but being prepared green, and without the fibre being properly separated and interwoven, it becomes brittle when dry, and does not last long. They make also baskets and very superior mats of plantain-fibre. There is, however, a species of hemp which grows very freely, and of which I am informed the fibre is singularly tough, and which might form a valuable article of export in the form of tow. Doubtless investigation may bring to light many valuable drugs—the *Strophanthos* proved an El Dorado till the market was glutted; while among the many lovely plants—the wild gladioli and other bulbs, the gardenia-like flowering shrubs, the tree orchids and the ferns—many species may command a sale in the British market, and help to make capital, while the more extended schemes which are to produce the dividends of the future are being developed.

The timber on the highlands is small and of no great value, but in the lowlands there are several kinds of valuable timber trees indigenous to the country, while ebony and other ornamental woods are, we believe, found on the Shiré. Many kinds of imported trees thrive excellently, both on the highlands and at the level of the lake. Of these the mango is doing well at Bandawé, and has grown for very many years on the Zambezi, imported by the Portuguese Jesuits; it is valuable both for its fruit and timber. The Neem, valuable for its oil and the medicinal properties of its bitter leaves, the blue gum and other eucalypti, the Gold Mohur tree, orange, lemon, and loquat also grow well, and prove that other trees growing in the same latitude and at the same altitude as those do in India would also thrive in Africa. Of such the two great timber trees, the teak and the Sal, would be worth introduction, as also the useful Mohwa tree, while, by the analogy of India, the oak and other timber trees of England should do well on the higher plateaus.

In conclusion we will endeavour to answer the question as to the suitability of the country for immigration. The Shiré highlands, with their cold bracing air, have proved by the test of many years to be well adapted to the conditions of European life. Scotch and English ladies have lived there in excellent health, and their children are robust and healthy. If this be so we think that the still higher plateaus further inland should prove healthy, and capable of producing the vegetables and other minor necessities of European life. But to attain to these highlands, the malarious coast district must be passed through, and the graves of many ladies in this area prove it deadly influence. The first requisite, therefore, is a means of rapid conveyance from the coast, together with more fully developed means of accommodation and comfort. The opening up of the navigation of the Zambezi from its mouth, thus establishing a direct communication with the sea-going steamers, would largely effect this, and the new steamer of the Lakes Company now put on the river leaves nothing to be desired for comfort. Enthusiasts may even picture the time when the railway—already projected—from the Cape shall be extended from Kimberley to the Zambesi, and so the malarious coast district be avoided

altogether. But even the coast area itself has long been peopled by British Indian settlers, who have penetrated the whole length of the Kwakwa. The shores of the lake would be admirably suited for Indian immigration. We would, however, urge that such immigrants be drawn from Northern India.

Nyassa-land is a country, as Lord Salisbury recently said, discovered by British, opened up, and to some extent civilised by us, and its possibilities we honestly believe to be great. Its climate is for the most part good, its scenery picturesque and enchanting. The time has come for its development and gradual civilisation, and Britain must decide now or never, whether this opportunity is to be ours, or whether this land—historical in its past associations with the names of Livingstone and his many successors, and full of promise for the future—is to be ours, or to be left to the Arab slave-dealer for the present, and the fortuitous exploitation of some European nation in the further future.

On the Zambezi Delta. By B. DANIEL J. RANKIN.—The author gave a general description of the Zambezi Delta from the conflux of the Shiré river to the sea. His paper contained also an account of the condition of the people, and the routes used by trade from the interior to the sea, showing how the primitive and inefficient means of communication have tended against the development of trade. He referred specially to the Inhamissengo or Kongoni outlet, and the Chindé river—its character and suitability for traffic. He spoke of the physical characteristics of the Chindé mouth; the advantages of using this as the trade outlet, both from the political and commercial point of view, showing how, by using this new outlet for trade, a commercial enterprise formed on the lines of the Niger or Imperial East Africa Company would have every prospect of success.

Monday, September 16th.

The Present and Future of Queensland. By CARL LUMHOLZ, M.A., Member of the Royal Society of Sciences of Christiania, Norway.

Notes on the Recent Development, Exploration, and Commercial Geography of British North Borneo. By ALEXANDER COOK, Treasurer-General, North Borneo Company.—This paper described the geography, development, and progress of the young colony from its conception, in 1887, by the founder, Sir Alfred Dent, K.C.M.G. The State of North Borneo, as it is now called, has been recently declared a British Protectorate. Situated midway between the Straits Settlements, China, and Australia, it is on the trade route of vessels trading between these ports, and forms a protection and a considerable addition to British trade and commerce. The coast here is about 1000 miles; area about 31,000 square miles, and population about 160,000. The country is owned and governed by the British North Borneo Company, under a Royal Charter granted in 1881. The government, import and export trade, sources of revenue, explorations, and agricultural wealth are referred to and explained. Gold and coal have been discovered in paying quantities, and companies have been granted concessions for prospecting and working on an extensive scale. Tobacco-planting has commenced by about twenty companies. The condition of the natives has been improved, and the abolition of slavery gradually accomplished. Schools are established. Immigration from China and India. Foreign trade for 1888 is valued at 447,569 dollars exports, compared with 145,444 dollars and 160,650 dollars imports for 1889 is estimated at 421,000 dollars, with an expenditure of 100,000 dollars. The country has splendid harbours and an excellent river.

manent means of communicating with the interior. The success of the undertaking is described as satisfactory to the natives and to the Company.

Recent Explorations in Peru and Bolivia. By H. GUILLAUME.—This paper described the efforts which have been made by Peruvian and Bolivian explorers and traders to open up the rivers and the dense forest country lying between them. Colonel Labre's journeys described in the 'Proceedings' for August, were referred to in detail. Padre Nicolas Armentia explored the Madre de Dios in 1885, and resided for some time in the country of the Araonas Indians. From its mouth for 280 miles the river receives no important tributary; the Padre believes it has a navigable course of 400 miles for steamers. Mr. Guillaume described in detail the gold-bearing region at the source of the Madre de Dios. He then referred at length to the explorations of Señor Carlos Fry on the Ucayali and its tributary the Urubamba.

Geographical Co-ordinates in the Valley of the Upper Nile. By E. G. RAVENSTEIN, *vide ante*, p. 641.

Greenland. By Dr. FRIDTJOF NANSEN.—This paper was the same as that which has already appeared in the 'Proceedings' for August last.

The Resources of Siberia and the Practicability of the Northern Sea Route. By H. N. SULLIVAN.—The author credited Captain Wiggins with being the first to reopen the trade route to Siberia via the Kara Sea by his surveys in the s.s. *Diana*, 1874. He was followed by many other navigators. Mr. Sullivan gave a brief account of the various expeditions over the next ten years, some in steamships, paddle-boats, sailing ships, and small sloops. There were in all twenty such successful trips between Europe and Siberia. The failures were few and unimportant, being directly traceable to mistakes in navigation or in the selection of vessels proper for such seas. Summing up the result, he gave Wiggins the credit for being the only navigator who has persevered and five times successfully navigated the Kara Sea, the only one who has stuck to the work and regularly studied the movements of the ice in these seas, and solved the problem of navigating these waters with certainty every summer.

Whereas iron steamers and sailing vessels have, under favourable circumstances, performed the feat, to ensure success regular Arctic wooden steamers should be employed, so that even in very unfavourable years a passage could be forced.

In 1887 Mr. Sullivan organised an expedition and accompanied Captain Wiggins in the ss. *Phoenix*, which reached the town of Yeniseisk, about 1500 miles up the river. Several months were spent in the country, prospecting it with the view of future commercial undertakings. The voyage of the Arctic steamer *Labrador* in 1888 was shown to be a success as far as the sea route was concerned, the only drawback being the inability to send the cargo up the river, owing to the grounding of the *Phoenix* on a sandbank near Yeniseisk whilst on her way down to meet the *Labrador*.

A new syndicate has lately been formed, and Captain Wiggins again sailed in the *Labrador* on the 5th August, and it is hoped complete success will be gained.

Siberia contained 5½ millions of square miles. From the north down to about the Arctic circle there was the treeless Tundra, covered in winter with nearly 10 feet of snow, the ground in summer thawing but to the depth of 12 inches. Yet this region was carpeted in summer with numerous flowers. Next they came to the forest region, extending for hundreds and thousands of miles. Both these regions contained graphite, copper, coal, or at least a valuable lignite, and exploration would probably reveal many deposits at present unknown. But the real wealth and the more habitable and populated region began with the northern limit of cultivation about the 60th parallel. The steppes nourished enormous quantities of cattle, sheep,

and horses. The main centres of the grain districts were at Baranoul and Semipaulatinsk on the confines of China, and the produce was conveyed in barges down the river to Tjumen. The Yenisei district also was a rich agricultural one. Gold, silver, antimony, arsenic, tin, lead, and precious stones abounded throughout the country. On the Upper Yenisei were ironworks. But the industry was in a neglected state, owing to want of capital. The manager of the Government Bank at Krasnoïarsk said to him, "If you English would only come out and work our minerals you would make more money than is made in gold mines. Local capital will only be put into gold-works, hence our other minerals are quite neglected." With regard to the gold in the country, when it was stated that Siberia produced one-tenth of the gold of the world, the purchasing power of the country would be readily conceived. Many of the mines were the property of the Government, but many of them also were in the hands of private persons.

To those people whose idea of a Siberian dwelling was that it was a mere hut, he would recommend an inspection of his photographs. Some wooden houses there were, as numerous people preferred them to stone and brick, but there were also large and important buildings in the principal towns. Churches and schools costing from 20,000*l.* to 50,000*l.* had been presented to the towns by the rich merchants and miners who sought an 'outlet for their wealth. The upper classes lived as luxuriously and had as grand houses and appointments as Europeans. The greater amount of what they consumed, except the simple bread and meat produced in their own country, had to come from Europe. They got a great many articles of German and French manufacture, and English or English-marked goods of German origin. Machinery was very much required in the country. What with the heavy cost of overland transit, coupled with the duty paid on goods entering Russia, they could imagine the profits arising on such goods carried by sea, duty free. They had proved, he thought, that there were means of communication by water, and that there was a certain trade to be carried on with Siberia. As to the concessions the Government had given them, some people had thought that after five years' freedom from duty the Government might not continue the concession. But that would depend entirely on the way they conducted their five years' business. If they could do any good to the country during these five years the Government, he believed, would extend the favour.

Tuesday, September 17th.

Report of the Committee consisting of General J. T. Walker, Mr. H. W. Bates (Secretary), General R. Strachey, Mr. W. T. Thiselton-Dyer, and Prof. W. Boyd Dawkins, appointed to investigate the Geography and Geology of the Atlas range in the Empire of Morocco. The Report includes Mr. Joseph Thomson's Report to the Committee with notes on the Geology and a list of the Plants and Coleoptera collected.

Explorations in Eastern New Guinea, the D'Entrecasteaux and Louisiade Islands. By BASIL H. THOMSON.

On the Bahrein Islands in the Persian Gulf. By J. THEODORE BENT.

The Jedars and other objects of interest in the District of Tiaret in Algeria. By Sir R. LAMBERT PLAYFAIR, K.C.M.G.

Models to illustrate the Action of Winds in Ocean Currents. By A. W. CLAYDEN. These ingenious models were exhibited and their construction explained by Mr. Clayden.

The Northern Territories of Canada. By J. G. COLMER, C.M.G.

The South Coast of West Java. By H. B. GUPPY, M.B.—In this paper the author dealt with a part of Java which has not hitherto been much described. It is one of the least familiar portions of this large island, a circumstance due partly to its paucity of anchorages and to the difficulty in landing; partly to its having been allowed to become in some places a kind of menagerie; and partly, also, to the fact that it lies remote from the chief seats of government. Now that the Netherlands Indian Government are rapidly carrying out their systematic survey of the Preanger Residency, it will not be long before the south coast of West Java will be much better known than it is at present; and the recent extension of the central railway to Garoet and Tjirajap will do much to effect this end. The author's tracks over West Java would make a chequered pattern on a map; but he has thought it best not to refer to localities already well known—localities which are now yearly visited by hundreds of visitors. Taking the central railway as his base, he performed nearly all the distance on foot, walking about 560 miles in all. In the paper he endeavoured to give a general idea of this south coast alone. The huge volcanic cones were landmarks to him, and nothing more; they had been well described by Junker and others, so he resisted the temptation of climbing them, and reserved his main efforts for the examination of the little described and remote south coasts of the Preanger and Bantam Residences. The object he had in view was to ascertain what physical evidence there was for the belief that the west end of Java was originally united with Sumatra. In this paper the author showed that all the evidence on the Java side of the Sunda Strait points to the opposite conclusion. Zoological evidence cannot be held sufficient to establish the previous connection between two islands without the physical evidence of such a change. The problem, as usually stated, seems to begin at the wrong end of the matter. Given the present distribution of plants and animals, it is then attempted to explain the previous arrangement of the land, and this is done too often without appealing to the physical evidence at all. In tracing geographical changes in the past, it would seem more reasonable to adopt an opposite method; but in the great majority of cases affecting the distribution of animals, it would be wiser in the first place to assume the *status quo*, and fall back when that fails on the physical evidence of the presumed changes.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian R.G.S.*)

EUROPE.

[**Danube**].—Mémoire sur les travaux d'amélioration du cours du Bas-Danube exécutés pendant la période 1873-1886 par la Commission Européenne. Galatz, J. Schenk, 1888: 4to., pp. 108, plans. [Presented by the Commission.]

The present Memoir, relating to the period from 1873-1886, is issued in continuation of those published in 1865 and 1873 by the European Commission. It is accompanied with a large folio Atlas of very detailed maps and plans of the Delta of the Danube and of its mouth, showing the latest work executed by the European Commission.

Hann, J.—Zur Meteorologie des Sonnblickgipfels. Wien, 1869: 8vo., pp. 25.

This pamphlet contains the results of the observations which have so far been made at the lofty station on the Sonnblick, in Austria, 10,170 feet high.

Kaulbars, Baron Nicolas.—*Aperçu des travaux géographiques en Russie.* Published by the Imperial Russian Geographical Society. St. Petersburg, 1889: pp. 292. [Presented by Mr. E. D. Morgan.]

Baron N. Kaulbars, one of two brothers, both distinguished in the field of geography, represented Russia at the late Geographical Congress held in Paris. To him was assigned the task, at somewhat short notice, of preparing a sketch of all that had been done to advance geography in that country. And though he disclaims for his review any title to be regarded in the light of a complete summary, calling it modestly a first and imperfect essay to trace out in broad lines the immense work that has taken ages to accomplish, the student will nevertheless find it a most useful guide. Where so many materials have to be compressed into one comprehensive survey, it is only reasonable to expect there should be gaps, and the author prepares us for these, especially with reference to hydrographical, geological, cadastral, and a vast number of other questions relating to geography.

Russia began her geographical career long after other nations had made considerable progress with theirs, but the energy she displayed soon placed her in the front rank. Her first surveys, dating from the middle ages, were, says Baron Kaulbars, mere crude attempts to estimate her territorial extent for purposes of taxation. Then came more detailed descriptions, and these were subsequently furnished with maps. The earliest attempt to delineate the whole of Russia cartographically dates from the year 1525, and is attributed to a Venetian geographer, Battista Agnese. Those of Wied, Münster, and Herberstein came afterwards, and in 1562 Anthony Jenkinson produced his map of Muscovy. About the same time the various adventurers, whether Cossacks, merchants, or hunters, who invaded Siberia in the latter half of the sixteenth century, began to furnish materials to their Government of the regions they had visited, and these data were utilised in preparing the so-called "great design" of Russia, a large map drawn before the year 1599 for the Tsar Boris Godunof, and published in 1614 by Gessel Gerard. This cartographical curiosity, divided into degrees 87 versts apart, forms an epoch in the history of Russian geography, and is remarkable for its accuracy. Soon afterwards, maps of Russia began to be more numerous, and towards the end of the 17th century an atlas was published, giving in twenty-four sheets the results of the first scientific expedition in that country, sent by the municipality of Tobolsk in 1667 to explore the region then and still known as the Kirghiz Steppe as far as the foot of the Altai Mountains. Hitherto there had been no astronomical or trigonometrical observations to supply precise data for maps. To the St. Petersburg Academy of Sciences, founded in 1725, belongs the honour of having first initiated these, learned foreigners being invited to lend their assistance in the task. It was at its instance that the brothers Delisle rendered important services by fixing astronomically a number of positions in various parts of Russia. Louis Delisle accompanied Behring in his great expedition to the north in 1732, describing for the first time the coast of Kamchatka, and rectifying the position of Siberia. Not less eminent were the services of his brother Joseph, whose astronomical expedition into Siberia in 1740 to observe the passage of Mercury across the Sun's disc, though unsuccessful in its primary object, owing to an overcast sky, resulted in the determination of a number of positions by astronomical observations, and these furnished the materials for his great atlas, published in 1745 by the joint labours of Delisle himself, Euler, Heinsius, and Winsheim, when the latitudes and longitudes of a number of places were first given with precision. Euler was an excellent mathematician, and published several good books on the best methods of map-making, which exercised a great influence on the development of geographical knowledge in Russia. The road to science once opened, a number of distinguished men trod in it, beginning with Gmelin and Pallas, who made careful studies of several regions, pointing out the natural resources and how these might be developed to benefit commerce. Surveying work was in those days not unattended by risk, as, for instance, when Lowitz, while leveling between the Don and the Volga, fell into the hands of the rebel Pugachef, and was ruthlessly put to death, his more fortunate companion escaping; and

Arnoldi, while engaged in similar work in the Caucasus, was despoiled by Lesghians of his papers and instruments. Peter the Great first established Russian cartography on the solid basis of astronomical observations, employing men of tried ability and methods recognised in Europe. The labours of military topographers continued the work thus begun, supplying men of science with the materials they stood in need of.

By the end of the 18th century the whole of Russia was fairly represented on maps, accurate enough to serve as a basis for more detailed explorations. Let it be here remarked that Russia, unlike the other States of Europe, exposed to all the ravages of the great wars at the beginning of the present century, was only affected by these on her western frontiers, the central and eastern provinces of her empire remaining undisturbed. Here exploration could continue unchecked save by want of means. It is to this period belong the first maritime efforts undertaken by Russia: the voyage of Krusenstjerna, accompanied by the academicians Tilesius and Langedorf, and a whole series of similar expeditions.

So much for Baron Kaulbars' general summary, and we advise our readers to follow him into the more detailed portions of his work. This is divided under several heads: works undertaken by the Ministries of War and Marine, the Imperial Geographical Society, and maps. These again are subdivided under Europe, Asia, and foreign countries. Under the first are grouped Russia in Europe, the Caucasus, and Orenburg; under the second, Western Siberia, Eastern Siberia, Turkestan, and the Trans-Caspian province; lastly, beyond the confines of Russian territory, come China and Central Asia, Bokhara and Khiva, Persia and Afghanistan, Asia Minor and the Balkhan peninsula—in short, all those fields of geographical enterprise and exploration in which Russian travellers and *litterati* have distinguished themselves. The Marine surveys include the Baltic and White Seas, the Arctic Ocean, the Black and Azof Seas, the Caspian and the Aral, the Pacific Ocean, comprising the Seas of Japan, Okhotsk, and Behring; lastly, inland waterspreads and foreign seas.

Of course, in a work of this kind, where brevity is essential, details are out of the question. The mere recital in two or three lines of the numerous expeditions—military, naval, scientific, and private—that have visited, explored, and surveyed all those lands and seas is alone sufficient to fill upwards of 200 pages. The reader will not fail to be struck with this record of all that has been accomplished for geography in a country where almost every other field of intellectual employment is closed to men of intelligence. The pen that has traced these pages is a sympathetic one; a geographer himself, the author appreciates the labours of his fellow-workers, counting no time lost in bringing them to the notice of geographers of all nations through the medium of the Paris Congress.

—[E. D. M.]

ASIA.

Curzon, [The Hon.] George N. [M.P.].—Russia in Central Asia in 1889, and the Anglo-Russian Question. London, Longmans, Green, & Co., 1889: 8vo., pp. xxiv. and 477, appendices, maps, illustrations, and index., Price 21s. [Presented by the Publishers.]

Those persons who had the advantage of hearing Mr. Curzon's paper on the Trans-Caspian Railway read in March last at an evening meeting of the Royal Geographical Society, and who signified by their applause how fully they accepted Sir Richard Temple's high eulogium on its effective delivery and mode of illustration, will welcome the appearance of the lecturer's lately published volume in amplification of the same subject. The title of the book, however, differs from that of the paper, and opens discussion of a much wider kind; one, indeed, which the merest glance at the appended bibliography will certify to be practically exhaustless. Under the head of "Persia" for instance—although one of the older works of reference named is found to date so far back as the past century—not less than a third of the hundred books in the whole list consists of works written or published during the last twenty years. In point of fact, the question of Central Asia is at present in one of its most lively stages, and has received an impetus from the completion of the railway to Samarkand such as that given to it a few years ago by the operation of the Russo-Afghan Boundary Commission and its resulting incidents. It need scarcely be said that

before that crisis also the ball had been set rolling from time to time, according as the events reported from Central Asia and the States adjacent were held of sufficient importance to arouse the attention of our Home Government.

In describing the circumstances of his application for leave to proceed on a journey to Samarkand, Mr. Curzon shows that he has good reason to be satisfied with the treatment experienced at the hands of Russian functionaries. His request was acceded to, and little time was lost in fulfilling the preliminary requirements of officialism. Though not permitted to visit the frontiers of Khurasan from the north, it must have been well known to him that Kalát-i-Nádiri and other salient points in that quasi-mysterious tract had long since been described by English explorers from the Persian side, so that there was really no special geographical feature to be brought to light, nor political secret to be revealed, for the benefit of travellers diverging to the neighbouring mountain barrier from the line of Trans-Caspian railway. His party, when assembled at Tiflis, was composed of "two Englishmen, three Frenchmen, an Italian, and a Dutchman," exclusive of guides and conductors; "about as representative a body," he remarks, "as General Annenkoff" (the constructor of the Trans-Caspian Railway) "in his most cosmopolitan of moments could have desired." The expedition was to some extent abnormal in character, and had doubtless its drawbacks and inconveniences; but our author takes no count of these, and the impression is left upon his reader's mind that, upon the whole, he accomplished a most interesting and instructive journey, in the course of which he was enabled to "do" far more than falls to the lot of the most expert of conventional tourists. He visited St. Petersburg, Moscow, Tiflis; he crossed over from Báku, the port of "the Region of Eternal Fire," to Uzun Ada, the stepping-stone to a civilised Trans-Caspia; he reached Merv "on the early morning of the second day after leaving the Caspian," having passed from the eastern shores of that sea, for a distance of 512 miles, along the southern border of the Kara-Kum desert below Khwarizm, or the land of the Chorasmis—a space wherein the occasional town, village, or hamlet are more immediately associated with tales of recent carnage than remote classical story; from Merv he followed a north-easterly route to Bukhara (visited in very different circumstances forty-five years ago by Joseph Wolff); and so he continued his course on to Samarkand, the favourite residence and eventually the burial-place of Timor, 382 miles from Merv.

Admitting that there is much of strictly geographical interest in this remarkable book, and that local statistics of traffic and commerce, together with details of railway construction in Central Asia, may be made legitimate subjects of consideration in relation to comprehensive geography, we cannot ignore the fact that in almost every page the undercurrent of thought is political. The significance of this element may be judged from the statement, which the reader will observe near the close of the volume (pp. 275-76), that "the Russian Minister at Teheran has but to wink his eye in the direction of the Caspian and Khorasan for the Shah to know exactly what is meant. The Trans-Caspian Railway is a sword of Damocles perpetually suspended above his head, just as the non-payment of the war indemnity is over that of his companion in misfortune, the Sultan of Turkey." A few lines lower down the page we read: "A sense of utter powerlessness against the Russians has been diffused abroad among the Central Asian peoples, and experience of the overwhelming strength of their conquerors has brought a corresponding recognition of their own weakness to the conquered."

Comment on these utterances would here be out of place. One word, however, as to the useful map at the commencement of the volume. It is the same as that used by Mr. Curzon when publishing his paper in the 'Proceedings.'

As there has been apparently an intention to define tracks or roads, as well as rivers, in Khurasan and Eastern Persia, it might have been well to have shown something of the approaches to Khiva from the south. The Rah-i-Takht—really the road to and along the left bank of the Oxus—taken by Shakespeare, and the Rah-i-Chashmah, Abbott's more direct way, though mere tracks in themselves, are among the acknowledged local lines of communication, and have been tested by European travellers. Attention to these, as well as to approaches

to Khiva or Khazar (Hazar) Asp, from the south-west, would serve the double purpose of checking the nomenclature and determining the true position of many places now dotted somewhat indiscriminately about the Kara-Kum desert. The routes, such as they are, have been entered in maps, and in some cases discussed in the letterpress, by Vambéry, Baker, and other modern explorers, but reference would have to be made to less recent works and the recorded labours of the earlier pioneers to arrive at anything like precision. At present the only point held worthy of distinctive letters in Mr. Curzon's map is Kabak-li on the Oxus, of which we have no data to suppose it anything but a "pumpkin ground," the traditional rendering of its name. But the supplement to our geographical knowledge here contemplated is perhaps rather the work of the professional geographer, and must, in such light, await the result of further survey and research. In the meantime, we may tender our best thanks to Mr. Curzon for the literary and, indeed, general outcome of his expedition on the Trans-Caspian Railway.—[F. J. G.]

Findlay, Alexander George.—A Directory for the Navigation of the Indian Archipelago and the Coast of China, from the Straits of Malacca and Sunda, and the passages east of Java, to Canton, Shanghai, the Yellow Sea, and Korea, with descriptions of the Winds, Monsoons, and Currents, and general instructions for the various Channels, Harbours, &c. Third edition. London, Laurie, 1889: 8vo., pp. xlviii. and iv. and 1478. Price 28s. [Presented by the Publisher.]

There is no need to commend Findlay's Directories to seamen. The present edition of the Indian Archipelago has evidently been brought diligently up to date, fresh information having been sought for in all directions. These works, it should be noted, are useful not only to navigators, but in many cases contain all the information available concerning out-of-the-way places, especially the smaller islands in the Indian and Pacific Oceans.

Moore, [Commander] Osborne.—The Bore of the Tsien-Tang Kiang (Hang-Chau Bay). 'Journal of the China Branch of the Royal Asiatic Society,' No. 3, 1888.

This is a detailed and elaborate report of the investigation made by Commander Moore in H.M.S. *Rambler* of the remarkable bore in Hang-Chau Bay. The most careful examination was made of the phenomenon in all its stages, and of the relation to the phases of the moon. As to what the "Bore" really is, Commander Moore states:—"The Bore cannot be accurately described as a wave. It is in no sense an undulation, nor is there any depression after it has passed. The same particles of water which rise with such a significant jump in the neighbourhood of Rambler Island, are precipitated over the vast bar of sand into the Tsien-tang. It is in this that the danger to shipping lies. In its effort to find equilibrium, the flood is travelling at a rate of 12 to 13 miles an hour, and overcomes everything in its progress. A wave, or two waves, of 6 to 10 feet in height, may be met with good anchors and chains. Not so the Bore. . . So far from there being any depression behind the cascade, our observations show that it is always succeeded by a rise of three or four feet of water. If the estuary terminated at Rambler Island, or the next cape in the Gulf, to the south-west, we should probably see a rise of 50 or 60 feet, as in the Bay of Fundy; but this outlet being there, the pent-up waters discharge themselves through it, and as soon as the level of the sea at their source falls, they fall also. If asked for a brief definition of the Eagre or Bore, I would say:—"Two-thirds of the flood-range of the day arrives in the river, at any given spot, in a quarter of an hour, and in such a form as to show the observer a well-defined body of water, advancing at a high speed, many feet above the level of the river where it is situated. The front or crest of this flood is in the shape of a bubbling cascade of foam, about as high as the mean river-level, pounding itself and the sea in front of it in precisely the same manner as the first onset of the ordinary flood-tide in a stretch of sand." Commander Moore's paper is amply illustrated with charts and diagrams.

[**Rees, J. D.**].—Seventh Tour of His Excellency the Right Honourable Lord Connemara, G.C.B.—Malabar, South Canara, Goa, Bellary, Cuddapah, North Arcot and Nellore. Folio, pp. 18, map. [Presented by J. D. Rees, Esq.]

GENERAL.

Hints to Travellers, Scientific and General. Edited for the Council of the Royal Geographical Society by Douglas W. Freshfield, Hon. Sec. R.G.S., and Captain W. J. L. Wharton, R.N., F.R.S., Hydrographer to the Admiralty. Sixth edition. London, the Royal Geographical Society, 1889: 12mo., pp. xii. and 430, maps and illustrations. Price 6s.; to Fellows, at the Office of the Society, 4s.

The present edition, which has been revised and enlarged, is divided into ten sections as follows:—I. Preliminary Hints, by Douglas W. Freshfield. II. Hints on Outfit, including Notes on Water Travel and Mountain Travel, compiled by Douglas W. Freshfield, with the aid of E. Whymper, J. Thomson, H. H. Johnston, J. Coles, and others. III. Medical Hints, by G. E. Dobson, M.A., M.D., F.R.S. IV. Surveying and Astronomical Observations, by John Coles, F.R.A.S., Instructor to the Royal Geographical Society, including Notes by Capt. Pratt, R.E., Lieut.-Col. H. H. Godwin-Austen, F.R.S., Col. Sir C. W. Wilson, R.E., K.C.B., Lieut.-Col. R. G. Woodthorpe, R.E., C.B., Francis Galton, F.R.S., and Gen. J. T. Walker, C.B., F.R.S., LL.D. V. Photography, by the late W. F. Donkin, M.A., F.C.S., Lecturer in Chemistry at St. George's Hospital, and Capt. Abney, C.B., R.E., F.R.S. VI. Meteorology and Climate, by H. F. Blandford, F.R.S., with Note by Cuthbert E. Peek. VII. Geology, by W. T. Blandford, F.R.S. VIII. Natural History, by H. W. Bates, F.R.S., including Notes by G. E. Dobson, M.A., M.D., F.R.S., Prof. W. H. Flower, F.R.S., Osbert Salvin, F.R.S., Lieut.-Col. H. H. Godwin-Austen, F.R.S., and J. Ball, F.R.S. IX. Anthropology, by E. B. Tylor, D.C.L., F.R.S., including Notes by H. W. Franks, C.B., F.R.S., J. G. Frazer, H. H. Johnston, and Francis Galton, F.R.S. Paper Moulding of Monuments, or Squeezes, by A. P. Maudslay. X. Industry and Commerce, by J. S. Keltie, Librarian, Royal Geographical Society. An Index is added to this edition.

Markham, Clements R. (C.B., F.R.S.)—A Life of John Davis, the Navigator, 1550-1605, Discoverer of Davis Straits. London, G. Philip and Son, 1889: cr. 8vo., pp. vi. and 301. Price 3s. 6d. [Presented by the Publishers.]

This volume forms the first of a new series, entitled—"The World's Great Explorers and Explorations." Edited by J. Scott Keltie, Librarian, Royal Geographical Society; H. J. Mackinder, M.A., Reader in Geography at the University of Oxford; and E. G. Ravenstein, F.R.G.S. Each volume of this series, it is stated, will, so far as the ground covered admits, deal mainly with one prominent name associated with some particular region, and will tell the story of his life and adventures, and describe the work which he accomplished in the service of geographical discovery. The aim will be, it is stated, to do ample justice to geographical results, while the personality of the explorer is never lost sight of. The following are announced to shortly appear, to be followed by others by the editors—John Franklin and the North-West Passage, by Captain Albert Markham, R.N.; Magellan and the Pacific, by Dr. H. H. Guillemard; Saussure and the Alps, by Douglas W. Freshfield, Hon. Sec. Royal Geographical Society. Mungo Park and the Niger, by Joseph Thomson; Palestine, by Major C. R. Conder, R.E.; the Himalaya, by Lieut. General K. Strachey, R.E., C.S.I., late President of the R.G.S.; Livingstone and Central Africa, by H. H. Johnston, H.B.M. Consul at Mozambique. The present volume treats of the life and voyages of Davis, together with their geographical results, under the following heads:—Chap. I. Home and Boyhood. II. Preparations for the North. III. The First and Second Arctic Voyages. IV. The Third Arctic Voyage. V. War Services. VI. Preparations for the South. VII. The Voyage to the Straits of Magellan. VIII. Progress of the Art of Navigation. IX. Authorship. X. The Dutch Voyage. XI. The First Voyage of the East India Company. XII. The Last Voyage. XIII. The Following up of the Work of Davis.—I. By the "Furious Overfall." XIV. The Following up of the Work of Davis.—II. By "Sanderson his Hope." The volume is illustrated with maps showing Davis's discoveries, reproductions of contemporary maps, and by a variety of illustrations bearing on the subject.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Danmark.—Generalstabens topographiske Kaart over ———. Scale 1:40,000 or 1·8 inches to a geographical mile. Kalchographeret og graveret ved generalstabens. Kjöbenhavn, 1888. Sheets:—Bælum, Möborg, Testrup, Torsminde. (*Dulau.*)

Finmarkens Amt (Norway).—Ethnografisk Kart over ———. Scale 1:200,000 or 2·7 geographical miles to an inch. J. A. Friis, Professor ved Universitetet i Christiania, Udgivet paa offentlig Bekostning, 1888. (*Dulau.*)

This is a very complete ethnographical map of Finmark. The physical features of the country are shown by contour lines, and the families to which the inhabitants belong are indicated by different symbols. In the case of towns, where there is a mixed population, the proportion of each race is given, and the localities where the nomadic portion of the population have their summer and winter settlements are also indicated. In addition to a very full explanation of the meaning of the symbols used in the map, a statistical table is given, containing particulars as to the proportions of the different races of which the population is composed in the several districts.

Frankreich in 4 Blättern, von Vogel. Scale 1:1,500,000 or 20·4 geographical miles to an inch. Gotha, Justus Perthes. Price 6s. (*Dulau.*)

Liguria.—Carta della ———, e Provincie Limitrofe (le due Riviere tra Nizza e Livorno). Scale 1:200,000 or 2·7 geographical miles to an inch. Genova, A. Donath, editore, 1889. (*G. Philip & Son.*)

Mitteleuropa.—Topographische Specialkarte von ———. Scale 1:200,000 or 2·7 geographical miles to an inch. Berlin. No. 111, Dokschiy; 274, Minden; 275, Hannover; 303, Paderborn; 304, Einbeck; 321, Beresno; 429, Ratisbor; 607, Oedenburg; 684, Mâcon; 712, Clermont-Ferrand. Price 1s. each sheet. (*Dulau.*)

Westpreussen.—Generalkarte von ———, von F. Handtke, nach den neuesten Materialien entworfen und gezeichnet. Scale 1:466,000 or 6·3 geographical miles to an inch. Glogau, Flemming. Price 1s. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of September 1889.

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ASIA.

India.—A Hindi Wall-Map of ———. Compiled, lithographed, and published by Babu Devendra Nath Dhar. Scale 1 : 1,470,000 or 20·1 geographical miles to an inch. To be had of Babu Kshetra Mohan Dhar, 38, Strand, Calcutta. (*Dulau.*)

This a very well drawn wall-map of India. The names of presidencies, divisions, towns, rivers, and mountains are given in Hindi. The most reliable material appears to have been used in its compilation, and it will doubtless prove of exceptional value in the native schools.

AFRICA.

Binnen-Seen-Kette.—Die Ostafrikanische ———, zwischen Kilimandscharo und Kaffa. 4° Südl. bis 6° Nördliche Breite. Eine oro-hydrographische Skizze nach Dr. Fischer, Thomson, Schuver, Cecchi, Borelli u. A. vornehmlich nach Teleki-Hühnel's Aufnahmen entworfen und gezeichnet v. L. Ritter von Höhnel. Scale 1 : 4,000,000 or 55·5 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1889, Taf. 14. Gotha, Justus Perthes. (*Dulau.*)

Matabele and Mashona Land.—The Northern Gold Fields. Prospectors' Sketch Map of Matabele and Mashona Land, compiled from personal exploration and available information by Louis P. Bowler. Pretoria, S.A.R., 1889. Scale 1 : 1,744,700 or 23·9 geographical miles to an inch. (*Dulau.*)

The area embraced in this map extends from 24° E. to 37° E. long., and from 15° 30' S. to 24° 20' S. lat. The geological features of certain districts are indicated by colouring, special attention being given to the gold-bearing localities, and the routes most frequently travelled are laid down. A number of notes, containing valuable information for the traveller, are given on the blank portions of the map. Those districts that are healthy, and which salted cattle and horses can live through, are distinguished from those where the contrary is the case; to this, however, the author appends a note in which he states that all are passable with care and diplomatic foresight.

In his remarks on the Bamangwato, under the heading "Khama's Slaves," Mr. Bowler gives Khama, who has been so highly spoken of by travellers and the authorities at Cape Town, a very bad character. He states that Khama has robbed his father and his uncle, and that there are a great many slaves in his country who are very badly treated by their masters, and have a wretched life. In another note the author calls attention to the frightful atrocities which the Matabele "daily commit" upon their Mashona, and other slaves, and

concludes with an appeal to humanity for immediate interference. The map contains a large amount of topographical detail, a proportion of which is probably hypothetical, and for some reason the Indian Ocean, lakes, and rivers are all coloured bright green.

ATLANTIC OCEAN ISLANDS

Canary Islands.—Das Thal von Orotava (Tenerife). Aufgenommen und gezeichnet von Dr. A. Rothplatz. Scale 1:50,000 or 1·4 inches to a geographical mile. Petermann's 'Geographische Mittheilungen,' Jahrgang 1889, Taf. 15. Gotha, Justus Perthes. (*Dulau.*)

CHARTS.

United States Charts.—No. 1162, Port Chimbote (Ferrol Bay). Peru, Price 1s. —. Pilot Chart of the North Atlantic Ocean. October 1889. With a Supplement illustrating "The St. Thomas-Hatteras Hurricane of September 3-12, 1889." U. S. Hydrographic Office. George L. Dyer, Lieutenant U.S.N., Hydrographer. Washington, D.C., 1889.

ATLASES.

Hachette et Cie.—Atlas de Géographie Moderne, édité par Hachette et Cie. Ouvrage contenant 64 Cartes en couleur, accompagnées d'une Texte Géographique, Statistique et Ethnographique, et un grand nombre de Cartes de Détail, Figures, Diagrammes, etc., par F. Schrader, F. Prudent, et E. Anthonie. Paris, Librairie Hachette et Cie, 1889. Parts 4 and 5. Price 10d. each part, containing three maps and letterpress. (*Dulau.*)

These two issues contain political and physical maps of Europe and Africa, a map of Oceania on Mercator's projection, and one of South America. Each map is accompanied by descriptive letterpress, illustrated by numerous diagrams and statistical tables.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von —. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Fünfzehnte (15) Lieferung. Inhalt: Nr. 49, Ost-Europa, Blatt 6 in 1:3,700,000, von A. Petermann. Nr. 69, Afrika, Blatt 4 in 1:10,000,000, von R. Lüddecke. Nr. 88, Vereinigte Staaten, Blatt 6 in 1:3,700,000, von A. Petermann. Sechzehnte (16) Lieferung. Inhalt: Nr. 47, Ost-Europa, Blatt 4 in 1:3,700,000 von A. Petermann. Nr. 58, Palästina in 1:1,200,000 von A. Petermann. Nr. 84, Vereinigte Staaten, Blatt 2 in 1:3,700,000, von A. Petermann. Gotha, Justus Perthes. 1s. 6d. each part. (*Dulau.*)

Sheets 47 and 49 form part of the map of East Europe, the former includes Central Russia, and the latter the country south of it as far as the Turkish and Persian frontier; it also contains two insets, one of Ararat, and another of Tiflis and its neighbourhood. Sheet 69 is part of the new map of Africa in course of publication in this atlas; it includes all the coast between Suakin and Cape Delgado and the interior as far as the eighteenth meridian east of Greenwich, thus embracing the greater portion of Equatorial Africa. Two insets are given, showing respectively Perim Island and the Straits of Babel-Mandeb. Sheets 84 and 88 are maps of portions of the United States, and belong to the six-sheet map of that country. Sheet 58 is a map of Palestine, which also contains an enlargement of the country to the north of Sur (Tyre).



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Cyprus.

By Lieut.-General Sir ROBERT BIDDULPH, G.C.M.G., C.B.,
late H.M. High Commissioner, Cyprus.

(Read at the Evening Meeting, November 11th, 1889.)

THE island of Cyprus is the third largest in the Mediterranean, being inferior in size only to Sicily and Sardinia. Its area is 3584 square miles. Its principal features are two mountain ranges, running pretty well parallel to each other from east to west. The northernmost of these two ranges extends almost the whole length of the island from Cape Kormakiti on the north-west to Cape St. Andrea at the end of the horn-like promontory which stretches for 40 miles from the north-east of the island. This promontory is called the Carpas, and the low mountain chain running through it is called the Carpas range. The westernmost and higher portion of the northern range is called the Kyrenia range, and rises to an altitude of 3340 feet. This range is of a remarkably picturesque outline, in some parts extremely rugged. It is mostly a single ridge without any remarkable spurs, and its summit is about two miles from the northern coast. It can be crossed in many places, but there are three well-defined passes over it, viz. the Akatou Pass, which separates the Kyrenia and Carpas ranges; the Kyrenia Pass, which is due south of the town of Kyrenia, and forms the approach to it from Nicosia; and the Myrtou Pass, further west. The chief mountain peaks of this range are Kornos, 3105 feet; Buffavento, 3140; and Pentedaktylos, 2400. The last named is a remarkably shaped rock in the centre of the Kyrenian range, owing its name to its shape, the word Pentedaktylos signifying in Greek "five-fingered." Beneath this rock there rushes out southward from the mountain side, at an altitude of 870 feet, a torrent of water, which never ceases to flow summer or winter, and which descending into the great plain in the centre of the island, carries its fertilising streams to the lands of several villages, its course marked by mills, gardens, and trees, until its water is exhausted by various irrigating channels. The principal village watered by this



stream is called in Greek Kythrea, and in Turkish Deyrmenlik (the place of mills). It is situated about 10 miles to the north-east of Nicosia.

A similar stream of water gushes from the northern side, about 12 miles west of the Kyrenia Pass, above the village of Lapithos, which, with the adjoining village of Caravas, are probably the most prosperous villages in the whole island. Smaller streams descend on either side of the range at various places—their waters are used for irrigation in the valleys.

The southern range of mountains is of a much more extensive nature than the northern range, which I have just been describing. The easternmost point of this range is the mountain of Santa Croce, so called from the church of the Holy Cross which stands on its summit. This mountain, which is 2260 feet in height, is of a peculiar shape, and from its isolated position it forms a prominent landmark, not only for vessels approaching the port of Larnaca, but also for those entering Famagusta. Beginning then from this point the southern range rapidly rises to considerable altitudes, finally culminating in Mount Troodos, the highest point in Cyprus, 6406 feet above the sea-level. The other chief peaks in the southern range are, Adelphe, 5305 feet, and Machera, 4674 feet. But it is not only in altitude that the Troodos range is distinguished; numerous spurs run down to the north and south, and as we proceed further west these radiate out to greater distances, so that half way between Troodos and the sea, the mountain range is not less than 20 miles wide. Here there are very considerable forests, many miles in extent, rarely visited save by wandering flocks and by wood-cutters, and affording shelter to the moufflon, or wild sheep of Europe, some 200 or 300 of which still roam over these hills.

On the map it will be seen that numerous rivers descend from both sides of the southern range. These are mostly dry in summer, but after rain their waters descend with violence, filling up the river-beds in the plains, carrying away trees and cultivated patches, and often rushing in a turbid stream into the bays of Famagusta and Morphou.

Between the two mountain ranges which I have thus briefly described there lies a great plain called the Mesaorea, which is the most fertile part of Cyprus, growing large crops of wheat, barley, and cotton. It was evidently once the bottom of the sea, for in many parts are large beds of marine shells—gigantic oysters and others—all clustered in masses. A noticeable feature of this plain is the number of flat-topped plateaux of various sizes, where the rock seems to have resisted the action of the water. The tops of these plateaux are clothed with short herbage, affording a scanty provision for flocks, and are usually from 100 to 200 feet above the plain.

The rivers which descend from the hills carry down large quantities of alluvial soil, and this forms in the eastern part of the Mesaorea a rich deposit, something similar to the Delta of the Nile.

The two rivers which mainly contribute to this plain are the Pedieus and the Idalia, the former taking its rise from the northern slopes of Mount Machera and the latter from the eastern slopes of the same mountain.

The Pedieus flows northward to Nicosia, and encircling that city, continues its course eastward through the Mesaorea, receiving the drainage of the northern range during its course, and falls into the sea near the ruins of the ancient city of Salamis. The Idalia, passing to the south of Nicosia through the classic valley of Dali, also flows eastward, and falls into the sea at Salamis, about half a mile from the mouth of the Pedieus. The beds of these rivers have, however, become so choked up with alluvial deposit towards the end of their course, that their waters overflow the plain and mingle together, so that their separate mouths can with difficulty be distinguished.

The only other considerable river rises on the northern slopes of Mount Adelphi, and after flowing to the north for about 20 miles, turns to the west, and passing the populous village of Morphou, flows into the Bay of Morphou.

The normal condition of these rivers is to be without water, but whenever there is a heavy rainfall in the mountains, the river "comes down," as it is called, and runs for one, two, or more days. During the winter months, from December to February, this frequently happens, and I have known the river Pedieus to be running for six weeks together, but this is rare.

It occasionally happens that the water descends with great suddenness and violence, causing disastrous floods. In December 1880, a storm of rain of the greatest violence burst over the valley of the Garilis, a small river which flows into the sea at Limassol. Six inches of rain were registered in three hours at the military cantonment at Polemidia, $3\frac{1}{2}$ miles from Limassol. The water overflowed the narrow channel and flooded the town of Limassol, washing down many houses, destroying much property, and causing the death of several persons. A similar calamity is reported to have occurred at Nicosia about twenty-five years ago. The river Pedieus, bursting its banks at a point just outside the western gate of the city, forced open that gate, which had been closed, and rushing through the town to the Famagusta Gate on the east side, the waters closed that gate, and, finding no egress, flooded all the low-lying central parts of the city, causing great damage and loss of life. The inhabitants of the Mesaorea are never more pleased than when the rivers come down abundantly, but from the want of proper storage and direction, much of the water runs waste into the sea, and much land is rendered uncultivable from being flooded. Since the British occupation an ancient canal has been repaired which carries off some of the surplus waters of the Pedieus, and irrigates a considerable tract of country, but the question of water storage in Cyprus is one for which there is much scope.

Considerable supplies of water for irrigation purposes are obtained by sinking wells. A long chain of wells are sunk at distances of five or six yards apart, and being connected by underground galleries, a channel is thus formed which conveys the water to a reservoir constructed at the foot of the last well, and it is thence raised to the surface by a waterwheel; or in some cases the level of the ground admits of the channel being brought out on the surface. In this way the town of Nicosia is supplied with excellent water, which is brought in two aqueducts from a distance of some miles. Larnaca and Famagusta and other towns have similar aqueducts.

Closely connected with the water supply is the forest question.

Cyprus was anciently clothed with forests. In Old Testament times much shipbuilding took place. In Balaam's prophecy we read that "ships shall come from the coast of Chittim," and it was with Cyprus timber that Alexander the Great built the fleets which he launched on the Tigris and Euphrates. At the present time the forests are confined to the mountain ranges, and threaten to disappear altogether.

At the time of the Egyptian occupation of Cyprus, vast quantities of timber were cut down and carried to Egypt. In this way the whole country round Larnaca was completely denuded of trees. Previous to that time, the low hills to the west of Larnaca were covered with forest. Now but a few dwarfed and scattered specimens remain. It is not till we approach the mountain of Troodos that we find anything like a real forest. Here, on the spot where the summer encampment of the troops is fixed, there are some magnificent specimens of the *Pinus Laricio*, which clothe the mountains from an altitude of 4500 feet upwards. The Aleppo pine furnishes, however, nine-tenths of the forests. It attains very fine dimensions in Cyprus, and flourishes on all sorts of mineral soils to an altitude of 4500 to 5000 feet. Trees of 10 feet in circumference are frequently met with. The forests continue westward from Troodos, though much encroached upon, and cruelly misused by reckless felling, and tapping for resin, until we pass the monastery of Kikko. Between this point and the sea, to the extremity of the watershed, there are real forests, and those of a very considerable extent, covering an area of over 200 square miles. These owe their immunity partly to their large extent; but more especially because the spurs and valleys leading to them are of so difficult a nature that the transport of timber is not easily effected. It is here that the few remaining cedars of Cyprus are to be found; occupying a space of seven or eight square miles, at a mean altitude of 4500 feet. They resemble the Atlas cedar; none of the trees exceed 80 years of age, an insignificant age for a species that reaches 2000 years.

The crest of the northern range is also fringed with trees, and there are other patches of forest land containing brushwood and a few trees. On the whole, the forest lands of Cyprus occupy an area of 400 square

miles. At the time of the British occupation, the ravages of the wood-cutter were to be seen in full operation, and it cannot be doubted that it was only a question of time when the last remaining forests of Cyprus should entirely disappear.

The destruction of the forests dates, however, from modern times. For many centuries a vigorous felling went on, which gave to the wood of Cyprus an unique reputation in the Eastern world. I have already alluded to the fleets built by Alexander the Great from Cyprus timber; the Venetians also took immense quantities for their commerce and marine. But this would only affect the old and fine trees, because young trees are of no use for shipbuilding; hence the forests would always be renewed from the young trees. Great damage must, however, have been done by the mines which were so extensively worked by the Phœnicians and the Romans, as trees of all sorts and sizes would be used for fuel. With the cessation of the mining, the forests must have again recovered themselves; and the true causes of the modern destruction of the forests are stated to be three in number, viz. fitful cultivation, fire, and the grazing of goats.

It is beyond the province of this paper to enter into detail on these points. They have been most ably dealt with by a French gentleman who was for three years the principal forest officer of Cyprus. But it may be interesting just to draw attention to the manner in which Cyprus is overrun by goats, which are the greatest enemies to forests in every country where they exist.

Taking five Mediterranean countries where goats abound, we find that there are:—

In Italy	14 goats per square mile, 63 per 1000 inhabitants.
„ Sicily	16 „ 74 „
„ Portugal	27 „ 210 „
„ Sardinia	25 „ 374 „
„ Cyprus	64 „ 1480 „

Cyprus, in fact, contains more goats in proportion to its area and population than any country in the world.

The manner in which the destruction of forests is accomplished by goats, is described by Darwin and others with regard to the island of St. Helena. "The goats were introduced into the island in 1502, and increased there in a short time beyond all measure. But as they only destroyed the young trees and respected the old, their ravages were not at first perceived. In 1710 the forests were still very thick; but in 1724 the old trees having arrived at the term of their existence, and having nearly all fallen, and those that ought to have replaced them not having sprung up, the forests disappeared almost suddenly, and were replaced by thick grass. The climatic disturbance thus caused to the island was very great and mischievous. In 1731 all stray animals were destroyed; but too late, as is always the case." Darwin, writing in

1836, adds: "Sandy Bay is nowadays so arid that it was necessary for me to see an official record to believe that trees had ever grown there."

The French forest officer whom I have mentioned, M. Madon, made a very careful examination of the best-preserved parts of the forests, and showed the following results:—

(1) For every hundred trees which were standing, there were 72 that had been felled and were left lying on the ground to rot.

(2) For the same number of standing trees (100) there were only 25 seedlings.

The first shows the result of wasteful and reckless woodcutting. The second is the result of the indiscriminate pasturage of goats.

I have dwelt a little on this forest question because it has very sensibly affected the wealth and productiveness of the island. As the forests disappeared, so did the soil that covered the hills. That soil was washed down to the plains, choked the river-beds and formed malarious swamps, the hills became bare rocks incapable of growing a blade of grass, and the locust at once took possession of the barren ground, whilst the absence of trees deprived the earth of its annually fertilising agent, leaf-mould. There is now a stony desert at the south-east of the island between Famagusta and Larnaca, where tradition says there was formerly a large forest, and to the east of the Mesaorea, on the now dry and desolate plateau, there are many lime-kilns now in ruins, which could not have been supplied except by a vegetation that has now altogether disappeared.

I have alluded to the appearance of the locust as being connected with the disappearance of the forests, and so much has been said about the locusts of Cyprus that I must not wholly pass them by without mention. The Cyprus locust is a small species, indigenous to the island, and is not the great migratory locust which is so well known. The young locusts make their appearance early in March, like very small flies in appearance, but they grow rapidly, and in a few days begin to hop along in masses. They do not begin to fly for about six weeks, and it is during the crawling stage that their destruction is effected. After they begin to fly nothing further can be done.

The inventor of the system used for destroying them is Mr. Mattei, a gentleman of Italian extraction, whose family have been long settled in Cyprus. He had observed their habit of moving straight in masses, so that on arriving at any deep ditch or well, they fell in and were unable to extricate themselves. On one occasion he was watching a large swarm which approached the city of Nicosia; on reaching the walls they climbed up them, and where the top of the wall was broken they entered the town, but in some places there was a smooth band of plaster on the top of the wall. He observed that they could not walk on this smooth surface, but fell back into the ditch. At once the idea flashed into his mind of making an artificial wall with a slippery top to it to

arrest their march. Filled with the idea he hurried home, and the first thing that met his sight was a table-cover of shiny American cloth. Dragging it off the table he began to cut it up into strips, in spite of the remonstrance of his wife, who thought he was out of his mind. These strips he sewed on to the top edge of lengths of canvas, and this originated the system which has continued with little change to the present time. Briefly the system was this: long screens of canvas about three feet high, with a band of oilcloth four inches wide running along the top edge of the screen, were stretched along the ground, supported by stakes driven into the ground at intervals. These screens often extend for several miles, and are placed so as to cross the line of march of the locusts. At the foot of the screen, pits about five feet long, $2\frac{1}{2}$ feet wide, and three feet deep, were dug, a wooden frame covered with zinc was put on the top of the pit so as to cover its edges. The locusts on arriving at the screen climb up it, but on reaching the top they find the strip of slippery wax-cloth, and fall down. After trying it over and over again, they turn the direction of their march and hop along at the foot of the screen, till they presently meet one of the pits and fall into it. They climb up the sides to get out again, but are met by the smooth zinc surface at the edge, and fall back into the pit; others come hopping in on top of them, and they are soon smothered by each other.

The system has been maintained by us in principle, but has been improved in detail. The wooden frames have been abandoned, and strips of zinc are used instead, which are laid on the ground, overlapping the edges of the pits. By this means they can be adapted to pits of any size, and a great saving is effected in the cost of transport, for when a swarm of locusts has been destroyed the screens and traps are taken up, packed on mules and donkeys, and carried off somewhere else. In places where the locusts are thick, or where they tend to accumulate, such as the mouth of a small ravine, very large pits are dug, covering a surface of 80 to 100 square feet. The locusts come pouring into these like a water-fall, and making the same rushing kind of noise.

When once the locusts begin to fly the traps are useless. The period for the locust campaign only lasts, therefore, for about six weeks, and everything depends on an active prosecution of the campaign during that period. If large swarms escape the whole work has to be gone over again the next year.

It was this consideration that led me to see that it was necessary to centralise the management of the locust campaign under one head. When each commissioner managed it in his own district, swarms constantly escaped from one district to another, and it was impossible to allot beforehand the screens and traps according to the wants of each district. Much time was lost in sending material from one district to another. I therefore placed the whole under the Government engineer,

and as public works were stopped for the time, all his organised labour was turned on to the work of locust destruction. The result was most successful. The number of locusts had been gradually increasing from 1879 to 1882. That year the conduct of the campaign was partially centralised, and the numbers of 1882 remained stationary. In 1883 the operations were thoroughly centralised under the Government engineer, and when the season opened in 1884 a large decrease was perceptible. The destruction was very complete that year, and thenceforward it was only necessary to have operations on a minor scale, so as to keep down any swarms that appeared. In 1885 I was able to report that the operations had practically come to a successful conclusion, and it has since been only necessary to prevent the few that annually appear, from increasing so as to make a fresh head again.

The greatest number which, it was calculated, were destroyed in one year was 195,000 millions in 1883, and the following year 56,000 millions. The estimated number of eggs laid by those that escaped in 1883 was 169,432 millions, and in 1887 it was 1216 millions, of which probably one-half would not come to maturity. The extraordinary fecundity of the locust is such that one pair of locusts left uninterruptedly to breed, would in ten years reach 2000 millions, even if one-half of the eggs failed to hatch out or were otherwise destroyed.

The total cost of the locust destruction from 1879 to 1885 was 66,000*l.*; but as the loss to the crops in a single year, had no steps been taken to destroy them, would have been not less than 80,000*l.*, the outlay has been recouped many times over. The manner in which locusts destroy green vegetation is perfectly appalling. With marvellous rapidity, and regardless of any interruption, they strip off every green thing, and in a few hours the green fields which they attack disappear, leaving a few brown stalks issuing from what appears to be a fallow field.

The Cyprus locust lays its eggs in hard rocky ground. Each female deposits a cocoon, which contains usually thirty-two eggs. The female bores a hole in the ground to nearly the depth of her own body, and there deposits the cocoon, which she then covers over with earth. Attempts were made at first to destroy the locusts by collecting the eggs, but though as much as 1300 tons weight were collected in one year, it was found to be a useless expense, and that the screen system could not be dispensed with.

The prevalence of locusts in Cyprus is noted in an old chronicle of the thirteenth century, but it is only since the forests were destroyed that they have made head in the manner which has been so notable in modern times. It is not likely that the great breeding grounds of the locust will ever again be clothed with forest; and we must look for the disappearance of the locust when the population increases, and with it the cultivation.

The population of Cyprus at the census of 1881 was 186,000, of whom one-quarter are Mahometans, and the remainder of the Greek Church. It is said that under the Venetians the population was 2,000,000, but it is believed that it did not exceed half that number. An English traveller who visited Cyprus in 1815, states that the population then was between 60,000 and 70,000, and the produce of the island was then so small that the population must have been very scanty.

The people are almost wholly agricultural, the principal products being wheat, barley, cotton, carobs, olives, and grapes. From the latter is made an excellent wine, which has been famous from the earliest ages. It was the excellence of the wine which led to the Ottoman conquest of Cyprus by Selim II. That monarch, being very fond of wine, sent an expedition, in 1570, to take the island. The agricultural operations are carried on in a most primitive manner, and the wine is manufactured in the rudest way, the bunches of grapes being squeezed under planks, and obtaining a rough acrid taste from the stalks and grape-stones which are squeezed with them. The amount of wine made every year in Cyprus is about 1,600,000 gallons, of which about four-fifths is exported, chiefly to France, Egypt, and Turkey.

The agricultural prosperity of Cyprus is a matter of the gravest interest to the Government, for on that prosperity the revenue entirely depends. There are hardly any large properties in Cyprus, and still fewer instances of land worked on the tenant farmer system. It is emphatically a land of peasant proprietors, with the result that there are no wealthy persons and no beggars. Property is universally divided amongst the children, and again subdivided, so that one hears of a man owning the sixteenth part of a hovel that is not worth as many shillings. To such an extent is the subdivision carried out, that there are no less than 600,000 registered holdings of real property, i. e. more than three for each inhabitant. On each holding there is a land-tax of four per 1000 of its registered value, and the collection of such small sums from so many owners causes much labour and difficulty. The chief tax on land is, however, the tithe, which is, under Turkish law, the actual tenth part of the produce. It is not quite right to speak of it as a tax, it is really a reserved rent. In Mahometan countries all the land belongs to the State, i. e. the Crown. As each country was conquered the Sultan granted the lands, reserving one-tenth of the produce as rent, and the land passes subject to that reservation. Nor can it be said to be an excessive rent. In India we find one-sixth, one-fourth, and even one-third reserved. Joseph reserved one-fifth in the land of Egypt. In England the landlord is supposed to get one-third, leaving two-thirds for the tenant occupier.

As might be expected, in a country which is almost wholly occupied by peasants, the houses are poor, and exhibit little architectural skill or beauty. They are mostly built of sun-dried bricks; the villages usually

contain from twenty to eighty houses, and there are but few considerable towns. The principal of these are: the capital, Nicosia, situated in the centre of the island, and having 12,000 inhabitants; Larnaca, the chief seaport, with about 7000 inhabitants; and Limassol, also on the south coast, with about 6000 inhabitants. These two ports divide between them nearly the whole of the sea-borne trade, Larnaca taking nearly half the exports and three-quarters of the imports, and Limassol the rest of the imports and about half the exports. There is also a small export trade from the ports of Famagusta, Papho, and Lefka, and a moderate trade at Kyrenia, chiefly carried on with the opposite coast of Karamania. To facilitate trade, good iron piers have been built at Larnaca and Limassol; and a breakwater at Kyrenia, where the small country vessels suffered much in winter from northerly gales.

The town of Nicosia presents a pleasing and picturesque appearance to the traveller approaching it from the south. It lies compactly situated within a line of old fortifications, which describe a regular circle round the town. As there is no suburb outside the wall, the ramparts neatly finish off the houses, whose roofs appear above them in pleasing irregularity. The area enclosed by the fortifications is less than a square mile, but at least half of it is occupied by gardens, as nearly every house has a garden attached to it; and viewed from the heights above, the houses are mixed with palm-trees and orange-trees, the latter in great abundance, and scenting the air of the streets quite heavily when in blossom.

Rising above all the surrounding buildings is the old Latin cathedral, now a mosque, with two handsome minarets built on to it. This is kept in very good repair, and underneath the carpets which cover the floor may be seen the old gravestones with the names and effigies of knights and ladies with Latin or old French inscriptions.

Before the Turkish conquest in 1570, Nicosia occupied a much larger area than it does at present; but in anticipation of the Turkish attack, and probably in order to facilitate the defence, the old fortifications were thrown down, and the present ramparts constructed to enclose a much smaller area. All the houses outside the new line of defences were destroyed, and the old ramparts may still be easily traced although they are annually ploughed over.

The point where the Turks attacked was marked for future ages by the erection of a mosque on the breach. There it stands to this day, being called the "Standard-bearer's Mosque." It marks the spot where the leader of the Turkish storming party planted the flag of the Crescent on the very summit of the breach, and there he fell. The Moslems, however, pressed forward and drove the Venetians backwards into the town. The defence of the latter must have been most gallant as they fell back on the Governor's palace. The track of the conquerors may be traced to this day by the tombs of their leaders who fell during their advance,

and, according to Turkish custom, were subsequently buried where they fell. The Standard-bearer was buried on the summit of the breach where the mosque now stands. At intervals along the streets leading to the old palace, now the "Konak" or Government Office, are the tombs of others of the Turkish leaders, and when we get to the Konak they are numerous. In the gateway itself is one, just outside is another, others in the courtyard and in the garden, and some upstairs in the rooms. You open a door of one of the offices, and in the corner is a tomb covered with a green flag. All the tombs are similarly cared for, and it strikes me as a fine soldierly trait of the Turkish character thus to hand down in perpetual remembrance the fame of the soldiers who achieved the Ottoman conquests, by the silent witness of their tombs on the spots where they fell. At the time of the British occupation, everything seemed to have been left untouched since the arrival of the Turks. On the ramparts there were the Venetian guns—large bronze pieces, each profusely ornamented and engraved with the name of the founder and the badges of the Republic; the carriages quite unserviceable from the effect of time; the shot, round and barshot, neatly piled up by the side of each gun; the magazines filled with powder, and over the door of the principal one, the armoured headpiece of a horse, such as you may see in the Tower of London—the last relic in Cyprus of the Venetian Knights.

After Nicosia fell, Famagusta still held out for many months. It was the last stronghold of the Venetians, and its gallant defence by the Venetian governor, Bragadino, is a matter of history. For eleven months he withstood the constant attacks of the Turks, and at last, worn out by losses and famine, he surrendered. The Turks, destitute of all sense of chivalry towards a brave enemy, revenged themselves for the losses they had experienced by flaying him alive. His skin was ultimately given up to the Venetians, and was deposited in an urn which was placed in one of the churches in Venice, where it is still to be seen.

Famagusta was fortified like Nicosia, and was jealously guarded by the Turks. The walls were kept in good order, and the Venetian guns remained on the ramparts. Near the water-gate, in a casemated room, were found heaps of decayed and rusty armour, which evidently had been thrown there after the capture of the city, and had remained there ever since. But though the walls of Famagusta are in good repair, the city within is in ruins. Never was there such a city of ruins; in the midst appear open spaces of ground, some even being ploughed and sown. About 800 persons, all Turks, live within the walls. A new town, called Varoshia, has sprung up half a mile outside the gates, where all the business is carried on. The old cathedral of Famagusta is a very striking building, terribly ruined, but still used as a mosque, like the old cathedral of Nicosia, to which I have alluded.

The only other fortress of any consequence was the fort of Kyrenia,

a mediæval-looking castle picturesquely situated at the water's edge, and occupying one side of the small harbour of Kyrenia. It is now used as a prison.

Three ruined castles, dating from the times of the Crusades, are situated on the northern range of hills. The most important of these is the Castle of St. Hilarion, situated about half a mile to the west of the Kyrenia Pass, and 2380 feet above the sea. Parts of it are in a fair state of preservation, and from the extent of its walls it must have required a garrison of at least 500 men. It was besieged and taken by Richard Cœur de Lion when he landed in Cyprus on his way to Palestine. It is easily approached from the east, but on other sides it is inaccessible.

The ruins of another castle are found on the top of Buffa Vento, which is nearly the highest peak on the northern range, and about half-way between Pentodaktylon and the Kyrenia Pass. Very little remains of this ruin, and the most perfect portion, containing a fine Gothic window, was much damaged by an earthquake five or six years ago. The castle is most difficult of access, and its building must have been a work of great labour. It can now only be approached by climbing from the foot of the hills.

The third ruined castle on the northern range is Kantara, situated in the Carpas at an altitude of over 2000 feet. It is in a better state of preservation than the castle of Buffa Vento, though not so good as St. Hilarion. It is called by the Greeks "Ekatonspitia" (hundred houses). From the castle of Kantara, looking westward along the northern shore, is one of the most beautiful views in the whole island.

There is another beautiful ruin in the northern range, viz. the old monastery of Bellapais, about three miles from Kyrenia. The refectory is still in good repair, and the rest of the building, though roofless, shows distinctly the monks' dormitories, the chapter room, cloisters, &c. The chapel of the monastery is still used as the village church. The tracery of the windows and cloisters is very perfect in many places.

These ruins all date back from the middle ages, mostly from the time of the Lusignan dynasty. Of ancient buildings of an earlier date there are but few remaining. Probably the oldest complete building is the church of the Holy Cross, on the top of the mountain of Santa Croce, which is stated by de Mas Latrie to have been founded in the fourth century. The lower part of the walls is evidently far more ancient than the upper structure, and it was possibly the site of some ancient heathen temple.

There are other places, mostly in ruins, of little architectural interest, but interesting by their traditions, such as the tomb of St. Barnabas (concerning which there is a curious tradition), the old Tower of Kolossi, near Limassol, and remains of ancient cities and temples, whose ruins yield old statues, of no very striking merit, to the antiquity hunter.

Extensive ruins, three miles north of Famagusta, indicate the site of Salamis, once a most flourishing seaport, the place where St. Paul landed when he visited Cyprus. It evidently was a wealthy place, and ruined columns, still remaining, show that an aqueduct conveyed water to the city from the spring at Kythrea, a distance of 25 miles as the crow flies. At Larnaca is the site of the ancient port and citadel of Kitium (or Chittim). A hill called Bamboolah marks the site of the latter, and yields to the excavator large blocks of finely cut stone.

There are two ancient independent monasteries, both situated on the southern range, viz. Kikko, which stands on the watershed of the Troodos range at an altitude of 3800 feet, and Machera, which is further east, and is most picturesquely situated on the northern slopes of the southern range. Kikko was founded 800 years ago, but the old building was destroyed by fire in 1817, and then lost all its books and MSS. It is very wealthy, being a shrine of some sanctity, and receiving many pilgrims every year. It possesses property, not only in Cyprus, but also in parts of Turkey, both in Europe and Asia, and considerable property in Tiflis.

Machera is not so large or wealthy as Kikko, but it is in some respects a more interesting spot. Amongst other objects of interest, it possesses a picture of a former abbot, who subsequently became archbishop of Cyprus, and was hanged by the Turks with the other bishops in 1823. If we may trust to tradition, he was probably the ablest man who ever occupied the archiepiscopal see. The portrait is a striking one, and was executed, I think, in Wallachia, where he had been sent on a mission when only a young member of the monastery of Machera.

If time did not fail me, I should like to prolong this subject, and to take you with me in imagination to some of the beautiful spots which are to be found in Cyprus, to enter the houses and see the townspeople at their avocations, the women weaving silk at the primitive looms, of which specimens were shown in the Colonial Exhibition three years ago; to visit the villages; to listen to the shepherds piping to their flocks; to follow the mountain tracks, where amidst the murmuring of the streams, by the side of a hazel copse, or under a shady old walnut tree, you might listen to the cawing of the crows and imagine yourself in England. But there is something besides time that fails me, and that is the capacity to do justice to the infinite variety of scenery which Cyprus affords, to depict adequately the charm of travelling through every part of the island, pitching one's tent in every variety of spot; now on a village green; now on a mountain side; one day in the depths of the silent forests; another day by a babbling stream under the shade of magnificent plane-trees; or again seeking shelter from the sun in the old refectory of the monks of Bella Pais.

If my failure to depict such scenes would induce any of you to go and visit them for yourselves, you would be amply repaid. The

exhilarating air imparts a peculiar charm to the scenery, which is heightened by the simplicity and hospitality of the villagers. To be in a country so near to civilisation, and yet where news from the outside world arrives only once a fortnight, and where there are no railways! Such is the place to refresh the mind wearied with daily papers, telegrams, sensational news, and advertisements, with the postman coming ten times a day with letters which you don't want to get.

It is a remarkable fact that most of those who have resided in Cyprus want to go back to it again. For my own part there is no country which I would so gladly revisit for a holiday, and I can therefore conscientiously recommend it to those who wish to escape from England during the trying months of January to April in this country.

After the paper,

Captain G. A. K. WISELY, R.E., referred to the energy of Sir Robert Biddulph in visiting every part of the island. The inhabitants were very poor, having been subjected to terrible exactions by former rulers, but everything possible was now being done to give them justice and good government, and to improve the public works of the island. Still, it was well to recognise that the Government could only give them a limited assistance, and a great field was there open for the sympathy of the British public. Wherever Sir Robert Biddulph went in Cyprus, the time of the medical officer, in the evening and during the luncheon hour, was occupied in attending to crowds of people who were suffering from very ordinary complaints, without the slightest idea how to get at a remedy. He was glad to know that an organisation had been started as far as possible to meet their wants, and to bring within their reach the medical and nursing facilities of which they stood in need. The Cyprus Society had been started for that purpose, and a lady had recently volunteered to go out in order to organise nursing work in the island.

The PRESIDENT congratulated the Society on having spent the first evening of the new Session in listening to so interesting a paper from so distinguished a servant of the Crown. Sir R. Biddulph had placed before them in a most lucid manner the broad outlines of the geography of Cyprus, telling them of its mountain ranges, its great central plain, and its rivers, which might properly be called only winter torrents. He had also spoken of his brilliant and successful campaign against the locusts. It was not his fault that he had not been equally successful in dealing with the goats. A good many years ago, when he (the President) was at the Colonial Office, Sir R. Biddulph constantly pressed that subject upon their attention. Two years ago, he (the President) spent some time on the shores of Syria under Mount Carmel, and the manner in which the goats there seconded the evil work of the woodcutters in denuding the hills of Palestine led him to sympathise with the sufferings of those who were interested in the forests of Cyprus. It was to be regretted that the Fortunatus of the fairy tale, who was the son of a gentleman of Famagusta, had left no descendants. He was sure he interpreted the feelings of all present when he tendered to Sir R. Biddulph the sincere thanks of the Society for his excellent paper.

*Letter from Mr. H. M. Stanley, on his Journey from the Albert Nyanza to the southern side of Victoria Nyanza.**

(Read at the Evening Meeting, November 25th, 1889.)

WE have received from Mr. Stanley the following, second, letter on the geography of the new regions traversed by the great expedition on which he is now engaged.† His description does not go farther towards the south-east than Karagwe, and does not, therefore, include the south-westerly extension of the Victoria Nyanza, mentioned as an important discovery in the telegrams:—

To the Secretary of the Royal Geographical Society, London.

CAMP AT KIZINGA, UZINJA,
August 17th, 1889.

SIR,—I remember, while standing on the edge of the plateau which overlooks the southern end of Lake Albert, in December 1887, that looking across the lake to the Unyoro plateau, and running my eye along its unbroken outline from north to south, I was much struck by the gradual but steady uplift of the land to a point near the lake's end, where a wide cleft separated the plateau from the disjointed mass and higher elevations culminating around Mount Ajif. Southward beyond Ajif we could see nothing but dark impenetrable clouds, ominous of a storm, yet underneath these night-black clouds lurked a most interesting mystery—that of the long-lost and wandering "Mountains of the Moon." Little did we imagine it, but the results of our journey from the Albert Nyanza to Unyampaka, where I turned away from the newly discovered lake in 1876, establish beyond a doubt that the snowy mountain which bears the native name of Ruwenzori or Ruwenjura is identical with what the ancients called "Mountains of the Moon."

Note what Scheabeddin, an Arab geographer of the fifteenth century, writes:—"From the Mountains of the Moon the Egyptian Nile takes its rise. It cuts horizontally the Equator in its course north. Many rivers come from this mountain and unite in a great lake. From this lake comes the Nile, the most beautiful and greatest of the rivers of all the earth."

If, adopting the quaint style and brevity of the Arab writer, we would write of this matter now, we would say:—"From Ruwenzori, the Snow Mountain, the western branch of the Upper Nile takes its rise. Many rivers come from this mountain, and uniting in the Semliki river, empty into a great lake, named by its discoverer the Albert Nyanza. From this lake, which also receives the eastern branch of the Upper Nile, issues the true Nile, one of the most famous of the rivers of all the earth."

* The route followed by Mr. Stanley and his caravan may be traced approximately by consulting Ravenstein's map of Eastern Equatorial Africa.

† The former letter was published in our May No., *ante*, p. 261.

But this is a matter of slight moment compared to the positive knowledge that in the least suspected part of Africa there has shot up into view and fact a lofty range of mountains, the central portion of which is covered with perpetual snow, which supplies a lake to the south of the Equator, and pours besides scores of sweet-water streams to the large tributary feeding the Albert Nyanza from the south.

You will remember that Samuel Baker in 1864 reported the Albert Nyanza to stretch "illimitably" in a south-westerly direction from Vacovia, and that Gessi Pasha, who first circumnavigated that lake, and Mason Bey, who in 1877 made a more careful investigation of it, never even hinted of the existence of a snowy mountain in that neighbourhood, nor did the two last travellers pay any attention to the Semliki river. I might even add that Emin Pasha, for years resident on or near Lake Albert, or Captain Casati, who for some months resided in Unyoro, never heard of any such remarkable object as a snowy mountain being in that region; therefore we may well call it an unsuspected part of Africa. Surely it was none of our purpose to discover it. It simply thrust itself direct in our homeward route, and as it insisted on our following its base-line, we viewed it from all sides but the north-east. Only then could we depart from its neighbourhood.

Surrounded as I am by the hourly wants of an expedition like this, I cannot command the time to write such a letter on this subject as I would wish. I must even content myself with allowing a few facts to fall into line for your leisurely consideration.

If you will draw a straight line from the debouchure of the Nile from Lake Albert, 230 geographical miles in a direction nearly south-west magnetic, you will have measured the length of a broad line of subsidence, which is from 20 to 50 miles wide, that exists between 3° N. lat. and 1° S. lat. in the centre of the African continent. On the left of this great trough, looking northward of course, there is a continuous line of upland, rising from 1000 to 3000 feet above it. Its eastern face drops abruptly into the trough; the western side slopes gently to the Ituri and Lomva basins. To the right there is another line of upland. The most northerly section, 90 miles, rising from 1000 to 3000 feet along the trough, is the Unyoro plateau, whose western face almost precipitously falls into the trough, and whose eastern face slopes almost imperceptibly towards the Kafur. The central section, also 90 miles long, consists of the Ruwenzori range, from 4000 to 15,000 feet above the average level of the trough. The remaining section of upland, and the most southerly, is from 2000 to 3500 feet higher than the trough, and consists of the plateaus of Uhaiyana, Unyampaka, and Ankori.

The most northerly section of the line of subsidence, 90 miles in length, is occupied by the Albert Nyanza; the central section, also 90 miles, by the Semliki river valley; the southernmost portion, 50 miles long, by the plains and the new Nyanza, which we have all agreed to

name the Albert Edward Nyanza, in honour of the first British Prince who has shown a decided interest in African geography.

You will observe, then, that the Semliki valley extends along the base of the Ruwenzori range; that the northern and southern extremities or flanks of Ruwenzori have each a lake abreast of it; that the Semliki river runs from the upper to the lower lake in a zigzag course.

If you were to make a plan in *relievo* of what has been described above, the first thing that would strike you would be, that what had been taken out of that abyss or trough had been heaped up in the enormous range, and if along its slope you were to channel out sixty-two streams emptying into this trough, and let the sides of the trough slope here and there sharply towards the centre, you would be impressed with the fact that Ruwenzori was slowly being washed into the place whence it came. However, all these are matters for geologists.

For months all Europeans on this expedition, before setting out on their journey towards Zanzibar from the Albert Lake, were exercised in their minds how Sir Samuel Baker, standing on a hill near Vacovia, five or six miles from the extremity of the Nyanza, could attach "illimitability" to such a short reach of water; but after rounding the Balegga Mountains, which form a group to the south of Kavalli, we suddenly came in view of the beginning of the Semliki valley, a sight which caused officers to ask one another, "Have you seen the Nyanza?" and the female portion of the Egyptian following to break out into rapturous "Lu-lu-lus." Yet we were only four miles away from the valley, which was nearly white with its ripe grass, and which indeed resembled strongly the disturbed waters of a shallow lake.

This part of the Semliki valley, which extends from the lake south-westerly, is very level; for 30 miles it only attains to an altitude of 50 feet above the lake. All this part can only recently have been formed, say the last few hundred years. In one of its crooked bends nearer the south-eastern range we stumbled suddenly upon the Semliki river, with an impetuous volume, from 80 to 100 yards wide, and an average depth of nine feet. Its continually crumbling banks of sandy loam rose about six feet above it. One glance at it revealed it to be a river weighted with fine sediment. When we experimented, we found a drinking glass full of water contained nearly a teaspoonful of sediment. We need not wonder then, that for miles the south end of Lake Albert is so shallow that it will scarcely float a row-boat.

Beyond the grassy portion of the valley, a few acacias begin to stud it, which as we proceed south-westerly, become detached groves, then a continuous thin forest, until it reaches the dense and rank tropical forest, with tall trees joined together by giant creepers, and nourishing in its shade thick undergrowths. Everything now begins to be sloppy wet, leaves and branches glisten with dew, weeping mosses cover stem, branch, and twig. The ground is soaked with moisture, a constant

mist rises from the fermenting bosom of the forest. In the morning it covers the valley from end to end, and during the early hours, stratum after stratum rises, and attracted by the greater drought along the slant of the Ruwenzori slopes, drifts upward until the summits of the highest mountains are reached, when it is gradually intensified until the white mist has become a storm-cloud, and discharges its burden of moisture, amid bursts of thunder and copious showers.

The valley sensibly rises faster in the forest region than in the grassy part. Knolls and little rounded hills crop out, and the ground is much more uneven. Violent streams have ploughed deep ravines round about them, and have left long narrow ridges, scarcely a stride across, at the summit between two ravines a couple of hundred feet deep. At about 75 miles from the Albert Nyanza the valley has attained about 900 feet of an altitude above it, and at this junction the forest region abruptly ends. The south-west angle of Ruwenzori is about east of this, and with the change of scene, a change of climate occurs. We have left eternal verdure, and the ceaseless distillation of mist and humid vapours into rain, behind, and we now look upon grass ripe for the annual fire and general droughtiness. From this place the valley becomes like a level grassy plain until the Albert Edward Nyanza is reached.

The southernmost stretch of the Ruwenzori range projects like a promontory between two broad extents of the ancient bed of the Albert Edward. To avoid the long detour, we cross this hilly promontory in a south-easterly direction from the Semliki valley, and enter eastern Usongora, and are in a land as different from that at the north-western base of Ruwenzori as early summer is from midwinter. As we continue easterly, we leave Ruwenzori on our left now, and the strangely configured Albert Edward Nyanza on our right. The broad plains which extend between were once covered by this lake. Indeed, for miles along its border there are breadths of far-reaching tongues of swamp penetrating inland. Streams of considerable volume pour through these plains toward the Nyanza from Ruwenzori, without benefiting the land in the least. Except for its covering of grass—at this season withered and dried—it might well be called a desert; yet in former times, not very remote, the plains were thickly peopled—the zeribas of milk-weed and dark circles of *Euphorbia*, wherein the shepherds herded their cattle by night, prove that, as well as the hundreds of cattle-dung mounds we come across. The raids of Waganda and the Warasura have depopulated the land of the Wasongora, the former occupants, and have left only a miserable remnant, who subsist by doing “chores” for the Warasura, their present masters.

From Usongora we enter Toro, the Albert Edward Nyanza being still on our right, and our course being now north-easterly, as though our purpose was to march to Lake Albert again. After about 20 miles' march we turn east, leave the plains of the Albert Edward, and ascend

to the uplands of Uhaiyana, which having gained, our course is south until we have passed Unyampaka, which I first saw in 1876.

South of Unyampaka stretches Ankori, a large country and thickly peopled. The plains have an altitude of over 5000 feet above the sea, but the mountains rise to as high as 6400 feet. As Ankori extends to the Alexandra Nile, we have the well-known land of Karagwé south of this river.

Since leaving the Albert Nyanza, between Kavalli and the Semliki river, we traversed the lands of the Wavira and Baregga. On crossing the Semliki we entered the territory of the Awamba. When we gained the grassy terrace at the base of the Ruwenzori range, we travelled on the border line between the Wakonju, who inhabit the lower slopes of Ruwenzori, and the Awamba, who inhabit the forest region of the Semliki valley. The Wakonju are the only people who dwell upon the mountains. They build their villages as high as 8000 feet above the sea. In time of war—for the Warasura have invaded their country also—they retreat up to the neighbourhood of the snows. They say that once fifty men took refuge right in the snow region, but it was so bitterly cold that only thirty returned to their homes. Since that time they have a dread of the upper regions of their mountains.

As far as the south-west angle of Ruwenzori, the slopes of the front line of hills are extensively cultivated—the fields of sweet potatoes, millet, eleusine, and plantations of bananas describe all kinds of squares, and attract the attention; while between each separate settlement the wild banana thrives luxuriantly, growing at as high an altitude as the summits of the highest spurs, whereon the Wakonju have constructed their villages.

Though we were mutually hostile at first, and had several little skirmishes, we became at last acquainted with the Wakonju, and very firm close friends. The common enemy were the Warasura, and the flight of the Warasura upon hearing of our advance, revealed to the Wakonju that they ought to be friends with all those who were supposed to be hostile to their oppressors. Hence we received goats, bananas, and native beer, in abundance; our loads were carried, guides furnished us, and every intelligence of the movements of the Wanyoro brought us. In their ardour to engage the foe, a band of them accompanied us across Usongora and Toro to the frontier of Uhaiyana.

South-west of Awamba, beyond the forest region of the Semliki valley, begins Usongora. This country occupies the plains bordering the north-west and north of Lake Albert Edward. The people are a fine race, but in no way differing from the finer types of men seen in Karagwé and Ankori, and the Wahuma shepherds of Uganda. Their food consists of milk and meat, the latter eaten raw or slightly warmed.

The Toro natives are a mixture of the higher class of negroes, somewhat like the Waganda. They have become so amalgamated with the

lower Wanyoro that we can find nothing distinctive. The same may be said of the Wahaiyana. What the royal families of these tribes may be we can only imagine from having seen the rightful prince of Usongora in Ankori, who was as perfect a specimen of a pure Galla as could be found in Shoa. But you need not conclude from this that only the royal families possess fine features. These Ethiopic types are thickly spread among the Wahuma of these Central African uplands. Wherever we find a land that enjoys periods of peace we find the Wahuma at home, with their herds, and, in looking at them, one might fancy himself transported into the midst of Abyssinia.

Ankori is a land which, because of its numbers and readiness to resistance, enjoys long terms of uninterrupted peace, and here the Wahuma are more numerous than elsewhere. The royal family are Wahuma, the chiefs, and all the wealthier and more important people are pure Wahuma. Their only occupation, besides warring when necessary, is breeding and tending cattle. The agricultural class consists of slaves, at least such is the term by which they are designated. The majority of the Wahuma can boast of features quite as regular, fine, and delicate as Europeans.

The countries to the south of the Albert Edward are still unexplored, and we have not heard much respecting them, but what we have heard, differs much from that which you find illustrated by that irregular sheet of water called Muta Nzige, in the 'Dark Continent' map.

Ruanda bears the name of Unyavingi, to the people of Ukonju, Usongora, and Ankori, and is a large compact country lying between the Alexandra Nile and the Congo watershed to the west, and reaching to within one day's long march of the Albert Edward. It also overlaps a portion of the south-west side of that lake. The people are described as being very warlike, and that no country, not even Uganda, could equal it in numbers or strength. The late queen has been succeeded by her son, Kigeri, who now governs.

Since the commencement of our march homewards from our camp at Kavalli, we have undergone remarkable vicissitudes of climate. From the temperate and enjoyable climate of the region west of Lake Albert we descended to the hothouse atmosphere of the Semliki valley—a nearly 3000 feet lower level. Night and day were equally oppressively warm and close, and one or two of us suffered greatly in consequence. The movement from the Semliki valley to the plains north of Lake Albert, brought us to a dry but a hot land; the ground was baked hard, the grass was scorched, the sun, but for the everlasting thick haze, would have been intolerable; in addition to which the water—except that from the Ruwenzori streams, was atrocious and charged with nitre and organic corruption. The ascent to the eastern plateau was marked by an increase of cold and many an evil consequence, fevers, colds, catarrhs, dysenteries, and paralysis. Several times we ascended to over 6000 feet

above the sea, to be punished with agues, which prostrated black and white by scores. In the early mornings, at this altitude, hoar-frost was common. Blackberries were common along the path in north-west Ankori, 5200 feet above the sea-level.

On entering Uzinja, south-west corner of Lake Victoria, the health of all began to improve, and fevers became less common.

I have jotted these few remarks down very hastily. Whether it is from lack of wholesome food or not, but I confess to feeling it an immense labour to sit down and write upon any subject. I do not agree with Shakespeare when he says:—

"Fat paunches have lean pates; and dainty bits
Make rich the ribs, but bankrupt quite the wits."

In our case, and I speak for all our officers as well as myself, "dainty bits" just now would brighten up our wits, for we suspect that our wits have strongly sympathised with the bodies' pains.

That you may know what the upper regions of Ruwenzori were like, I send you Lieut. Stairs' account of his ascent to a height of nearly 11,000 feet.

Yours obediently,

HENRY M. STANLEY.

LIEUTENANT STAIRS' ACCOUNT OF HIS ASCENT OF RUWENZORI, TO A
HEIGHT OF 10,677 FEET ABOVE SEA-LEVEL.

H. M. Stanley, Esq.,
Commanding Emin Pasha Relief Expedition.

EXPEDITION CAMP, June 8th, 1889.

SIR,—I have the honour to present you with the following account of an attempt made by me to reach the snow-capped peaks of Ruwenzori.

Early on the morning of the 6th June, accompanied by some forty Zanzibaris, we made a start from the Expedition's camp at the foot-hills of the range, crossed the stream close to camp, and commenced the ascent of the mountain.

With me I had two aneroids, which together we had previously noted and compared with a standard aneroid remaining in camp under your immediate observation; also a Fahrenheit thermometer.

For the first 900 feet above camp the climbing was fairly good, and our progress was greatly aided by a native track which led up to some huts in the hills. These huts we found to be of the ordinary circular type so common on the plains, but with the difference that bamboo was largely used in their interior construction. Here we found the food of the natives to be maize, bananas, and colocasia roots. On moving away from these huts we soon left behind us the long rank grass, and entered a patch of low scrubby bush, intermixed with bracken and thorns, making the journey more difficult.

At 8.30 a.m. we came upon some more huts of the same type, and found that the natives had decamped from them some days previously. Here the barometer read 23.58 and 22.85; the thermometer 75° F. On all sides of us we could see *Dracaenas*, and here and there an occasional tree-fern and *Mwab* palm; and, tangled in all shapes on either side of the track, were masses of long bracken. The natives now appeared at different hill-tops and points near by, and did their best to frighten us back down the mountain, by shouting and blowing horns. We, however, kept on our way up the slope, and in a short time they disappeared and gave us very little further trouble.

Of the forest plains, stretching far away below us, we could see nothing, owing to the thick haze that then obscured everything. We were thus prevented from seeing the hills to the west and north-west.

At 10.30 a.m., after some sharp climbing, we reached the last settlement of the natives, the cultivation consisting of beans and colocasias, but no bananas. Here the barometer read 22.36; thermometer 84° F. Beyond this settlement was a rough track leading up the spur to the forest; this we followed, but in many places to get along at all we had to crawl on our hands and knees, so steep were the slopes.

At 11 a.m. we reached this forest and found it to be one of bamboos, at first open, and then getting denser as we ascended. We now noticed a complete and sudden change in the air from that we had just passed through. It became much cooler and more pure and refreshing, and all went along at a faster rate and with lighter hearts. Now that the *Zanzibaris* had come so far, they all appeared anxious to ascend as high as possible, and began to chaff each other as to who should bring down the biggest load of the "white stuff" on the top of the mountain.

At 12.40 p.m. we emerged from the bamboos and sat down on a grassy spot to eat our lunch. Barometers 21.10 and 27. $\frac{94}{120}$. Thermometer 70° F. Ahead of us, and rising in one even slope, stood a peak, in altitude 1200 feet higher than we were. This we now started to climb, and after going up it a short distance came upon the tree-heaths. Some of these bushes must have been 20 feet high, and as we had to cut our way foot by foot through them, our progress was necessarily slow and very fatiguing to those ahead.

At 3.15 we halted among the heaths for a few moments to regain our breath. Here and there were patches of inferior bamboos, almost every stem having holes in it, made by some boring insect, and quite destroying its usefulness. Under foot was a thick spongy carpet of wet moss, and the heaths on all sides of us, we noticed, were covered with "Old Man's Beard." We found great numbers of blue violets and lichens, and from this spot I brought away some specimens of plants for the Pasha to classify. A general feeling of cold dampness prevailed; in spite of our exertions in climbing, we all felt the cold mist very much. It is this continual mist clinging to the hill-tops that no doubt causes all the

vegetation to be so heavily charged with moisture and makes the ground under foot so wet and slippery.

Shortly after 4 p.m. we halted among some high heaths for camp. Breaking down the largest bushes, we made rough shelters for ourselves, collected what firewood we could find, and in other ways made ready for the night. Firewood, however, was scarce, owing to the wood being so wet that it would not burn. In consequence of this, the lightly-clad Zanzibaris felt the cold very much, though the altitude was only about 8500 feet. On turning in, the thermometer registered 60° F. From camp I got a view of the peaks ahead, and it was now that I began to fear we should not be able to reach the snow. Ahead of us, lying directly in our path, were three enormous ravines; at the bottoms of at least two of these there was dense bush. Over these we should have to travel and cut our way through the bush. It then would resolve itself into a question of time as to whether we could reach the summit or not. I determined to go on in the morning, and see exactly what difficulties lay before us, and if these could be surmounted in a reasonable time, to go on as far as we possibly could.

On the morning of the 7th, selecting some of the best men, and sending the others down the mountain, we started off again upwards, the climbing being similar to that we experienced yesterday afternoon. The night had been bitterly cold, and some of the men complained of fever, but all were in good spirits, and quite ready to go on. About 10 a.m. we were stopped by the first of the ravines mentioned above. On looking at this I saw that it would take a long time to cross, and there were ahead of it still two others. We now got our first glimpse of a snow peak, distant about two and a half miles, and I judged it would take us still a day and a half to reach this, the nearest snow. To attempt it, therefore, would only end disastrously, unprovided as we were with food, and some better clothing for at least two of the men. I therefore decided to return, trusting all the time that at some future camp a better opportunity for making an ascent would present itself, and the summit be reached. Across this ravine was a bare, rocky peak, very clearly defined, and known to us as the south-west of the "Twin Cones." The upper part of this was devoid of vegetation, the steep beds of rock only allowing a few grasses and heaths in one or two spots to exist.

The greatest altitude reached by us, after being worked out and all corrections applied, was about 10,677 feet above the sea. The altitude of the snow peak above this would probably be about 6000 feet, making the mountain say, 16,600 feet high. This, though, is not the highest peak in the Ruwenzori cluster. With the aid of a field glass I could make out the form of the mountain top perfectly. The extreme top of the peak is crowned with an irregular mass of jagged and precipitous rock, and has a distinct crater-like form. I could see, through a gap in the

near side, a corresponding rim or edge on the farther, of the same formation and altitude. From this crown of rock, the big peak slopes to the eastward at a slope of about 25° , until shut out from view by an intervening peak; but to the west the slope is much steeper. Of the snow, the greater mass lay on that slope directly nearest us, covering the slope wherever its inclination was not too great. The largest bed of snow would cover a space measuring about 600 by 300 feet, and of such depth that in only two spots did the black rock crop out above its surface. Smaller patches of snow extended well down into the ravine; the height from the lowest snow to the summit of the peak would be about 1200 feet or 1000 feet. To the E.N.E. our horizon was bounded by the spur which, starting directly behind our main camp, and mounting abruptly, takes a curve in a horizontal plane and centres on to the snow peak. Again, that spur which lay south of us also radiated from the two highest peaks. This would seem to be the general form of the mountain, namely, that the large spurs radiate from the snow peaks as a centre, and spread out to the plains below. This formation on the west side of the mountain would cause the streams to start from a centre, and flow on, gradually separating from each other until they reach the plains below. There they turn to the W.N.W. or trace their courses along the bottom spurs of the range and run into the Semliki river, and on to the Albert Nyanza. Of the second snow peak which we have seen on former occasions I could see nothing, owing to the "Twin Cones" intervening. This peak is merely the termination, I should think, of the snowy range we saw when at Kavalli's, and has a greater elevation, if so, than the peak we endeavoured to ascend. Many things go to show that the existence of these peaks is due to volcanic causes. The greatest proof that this is so lies in the numbers of conical peaks clustering round the central mass and on the western side. These minor cones have been formed by the central volcano getting blocked in its crater, owing to the pressure of its gases not being sufficient to throw out the rock and lava from its interior; and consequently the gases, seeking for weak spots, have burst through the earth's crust and thus been the means of forming these minor cones that now exist. Of animal life on the mountain we saw almost nothing. That game of some sort exists is plain from the numbers of pitfalls we saw on the road-sides, and from the fact of our finding small nooses in the natives' huts such as those used for taking ground game. We heard the cries of an ape in a ravine, and saw several dull greyish-brown birds like stone-chats, but beyond these nothing.

We found blueberries and blackberries at an altitude of 10,000 feet and over, and I have been able to hand over to the Pasha some specimens for his collections, the generic names of which he has kindly given me, and which are attached below. That I could not manage to reach the snow and bring back some as evidence of our work, I regret very much, but to have proceeded onwards to the mountain under the con-

ditions which we were situated I felt would be worse than useless; and though all of us were keen and ready to go on, I gave the order to return. I then read off the large aneroid, and found the hand stood at 19·90. I set the index pin directly opposite to the hand, and we started down hill. At 3 p.m. on the 7th I reached you, it having taken 4½ hours of marching from the "Twin Cones."

I have the honour to be, Sir,

Your obedient servant,

W. E. STAIRS, *Lieut. R.E.*

P.S.—The following are the generic names of the plants collected by me. Emin Pasha has kindly furnished them:—

1. Clematis.	14. Sonchus.	27. Asplenium.
2. Viola.	15. Erica arborea.	28. Aspidium.
3. Hibiscus.	16. Landolphia.	29. Polypodium.
4. Impatiens.	17. Heliotropium.	30. Lycopodium.
5. Tephrosia.	18. Lantana.	31. Selaginella.
6. Elycina (?).	19. Moschosma.	32. Marchantia.
7. Rubus.	20. Lissochilus.	33. Parmelia.
8. Vaccinium.	21. Luzula.	34. Dracena.
9. Begonia.	22. Carex.	35. Usnea.
10. Peucedanum.	23. Anthistiria.	37. Tree-fern.
11. Gnaphalium.	24. Adiantum.	38. One fern.
12. Helichrysum.	25. Pellia.	39. One polypodium.
13. Senecio.	26. Pteris aquilina.	} Unknown.

Mr. Rockhill's attempt to reach Lhassa.

In our July number (*ante*, p. 439) we gave a brief account of the first stages in the journey of Mr. W. W. Rockhill (formerly Secretary to the American Legation in Peking), who set out from Peking last winter with the hope of reaching Lhassa. The following is a short narrative of his journey, which he has communicated to Mr. H. H. Howorth, M.P., in a letter dated from Chung-king, Szu-chuan, August 2nd, 1889.

He says:—Imagining, I hope not rashly, that you and the Royal Geographical Society might like to be informed concerning a journey through China, Mongolia, and Eastern Tibet, on which I have been occupied since last winter, I write to give you a short summary of the places through which I have passed. I left Peking in the early part of December, passed through Chil-li, then through Shan-si, and crossing the Yellow River at Tung-kuan, entered Shen-si. Then I went to Hsi-ngan-fu, and thence to Kan-su, which I traversed in its entire length to Sin-ning. I stopped for some time at the lamasery of Kumbun (called in Chinese T'ar-szu), or rather at the village of Luser, within a few minutes' walk of it. Here I was detained for some time by the great difficulty of getting men willing to go through the Sifan country

around the Koko-nor. The Sifan, whom Prjevalsky has dubbed Tangutans (the Mongol name for them), call themselves Bo-pa (written Bod-pa), the name used by all Tibetans, save those of East Tibet, in speaking of themselves; hence it would be infinitely better to call the Sifan Tibetans, or Northern Tibetans.

Finally I set out with four men, six horses, and six camels, went round the north side of the Koko-nor, and then south-west to Dulan-kuo (not Dulan-kit, which is impossible Mongol, Dulan-kuo meaning "hot place"), the residence of the Ching-hai-wang. I did not follow the same route as Prjevalsky. Leaving Dulan-kuo, I crossed the Tsaidam (the Chinese call it Wu-Tsaidam, or the Five Tsaidam, from its five principal divisions) to Barong Tsaidam (i. e. South Tsaidam). Thence I went to Shang, east of Barong, a large piece of country, which is governed by a lama from Trashil'unpo, it having been presented to the Talé lama by the prince of Tsaidam as a gift. The river which passes at Shang (erroneously put down on our maps as Bayan-gol), called the Yohuré-gol, is the principal river of the Tsaidam. I ascended its course to its two sources, south of the Kuen-lun range (why Kuen-lun?), in the lakes called Tosu-nor and Alang-nor (the latter lake is frequently called Areki-nor, Alang being a rather obscene word). During this trip I crossed the Kuen-lun range by two very high passes, both of them difficult: the Arumyè-Kor, near the Tosu-nor (the aneroid read on the top of pass 16.75 and 16.65), and the Nomoran-ula, near the Alang-nor (aneroid 16.95). This section of country has never been explored before.

After exploring this country, I went back over the Nomoran-ula to Barong Tsaidam to see the Dsassak. My intention was to take the high road to Lh'asa, and I hoped by pushing on very rapidly (in the style of Fred Burnaby) to get to the Tibetan capital. The road traverses an entirely uninhabited country till one reaches Nag-ch'u-ká, twelve days from Lh'asa. At Barong Dsassak, the camp of the Dsassak, I heard that the Russian expedition to Tibet had reached Lh'asa. I was assured that they had reached their destination by a number of persons, including the Dsassak, so I decided to try and get through East Tibet by way of Ch'amdo, Bat'ang, and Lit'ang. I exchanged my camels for ponies, laid in a supply of tsamba and butter, and was so fortunate as to get a good guide to take me as far as Jyè-Kemdo, south of the Dré-ch'u. For thirteen days we travelled south over a very high country, only traversed here and there by low ranges of hills. We suffered a great deal from the cold and the rarefied air. The horses also fell off rapidly, and by the time we reached the south side of this desert, out of my seventeen horses about five only were serviceable. We crossed the Kuen-lun range by the Hato Pass, a better but stonier pass than the Nomoran (Hato means "stony," Nomoran "easy"), and the Yellow River (Ma-ch'u) at its sources, a couple of miles west of the Ts'aka-nor.

Here I may note that there is no lake called Oring-nor east of the Ts'aka-nor, but one called Tsaga-nor. Ts'aka-nor means "salt lake," but I do not know what Tsaga means. After crossing the Ma-ch'u we crossed the big marsh called Karmat'ang. I mention this place only to note that we all, animals included, suffered more from the rarefied atmosphere while crossing this plain than we did on mountains much higher. I cannot explain this, but it was undoubtedly the case. My men were in great fear while around the sources of the Yellow River and Karmat'ang, as this part of the country is very frequently traversed by the Golok, with whom Prjevalsky had a serious fight when trying in 1884 to travel by the same route. We fortunately got through safely to Nam-ts'o, as the northernmost district of K'ams or Eastern Tibet is called. The Diba, a mighty fighting-man, and very wealthy for these parts, was very kind to me. He also assured me that the Russians had reached Lh'asa about February of this year. After two days spent with him, and long talks over the subject, I persuaded him to give me yaks and a guide as far as Jyé-kundo (two days south of the Dré-ch'u). The promise of a revolver if I reached this place helped on matters very materially.

Jyé-kundo figures in the survey of the Pundit A—K as Kégido, why I cannot imagine, as such a name is unknown. It is called Jyé-kundo or Jyé-kor. Here I must remark that while the Pundit's survey is extremely accurate, he has in nearly every instance got the names of places, rivers, and mountains wrong. Thus he writes Kégido for Jyé-kundo, Kanzégo for Karozé, Jokchen for Zoch'en, Daugo for Chango, &c., &c.

We followed a narrow mountain trail over a number of snow-covered peaks (we were in the latter part of May) for four days, when we came to the banks of the Dré-ch'u. Here we nearly got stopped by the natives, but fortunately by a forced march we reached a place near Zonyik-gomba and crossed the river, which was very swift and about 50 to 60 yards broad, swimming our horses and yaks, and crossing ourselves in small skin boats like coracles. In these four days we lost four horses, which we had to abandon in the snow. Two days more brought us to Jyé-kundo, the first Tibetan town we had seen. There are several small villages north of it, all the way from near where the Déba of Nam-ts'o lives, but they are of little importance; the rich people all live in tents.

At Jyé-kundo my troubles with the lamas commenced; there is a large lamasery here of about 2000 lamas, and the *pénab* of Jyé-kundo is a lama. He forbade the people buying anything of me, or selling me anything, serving me as guides, or hiring me yaks. This put me in a most difficult position. The road branches here, one road going to Ch'amdo, another to Tachienlu. The first place is about 15 days distant, the latter 30 days. If I could get to Ch'amdo I should feel safe, as I knew the two Ch'amdo *kanpo*, who had brought the tribute to Peking some four years ago, and who had asked me, should I ever

travel in Tibet, to come to their town; but it proved utterly impossible to get a guide. The *pönbo* had left Jyé-kundo to go to Tendo, some four days north, to consult with other chiefs about what he should do with me. I felt it was not safe to await his return, so leaving all my luggage behind I started off for Tachienlu with two Chinese and a Horba Tibetan, who did not feel bound, being a Kanzé man, to obey the *pönbo's* orders. Thirteen days' travel south-east, during which time we once more crossed the Dré-ch'u and the Za-ch'u, brought us to Kanze, another large Tibetan town with a very large lamasery. On the road we camped away from all villages, lamaserics, &c., only trusting ourselves with the *Drukpa*, or black-tent people, who were always extremely kind. The road we followed is very much travelled by caravans, mostly of tea-merchants. Nearly half the tea for Lh'asa, Trashil'unpo, Ch'amdo, Lari, &c., passes by this route, as, though longer than the road by Lit-ang, Ba-t'ang, &c., it is easier travelling. At Kanze the lamas were even worse than at Jyé-kundo, and wanted to turn me out of town at once, but I managed to rest my ponies and men there for three days, when I left for Dawo, as the Chinese call Jésemji, six days south-east. At Chango (not Dango), we had some trouble, but got off safely, and from there we followed the Nya-ch'u down to Dawo. The Nya-ch'u here bends south and the Za-ch'u empties into it some two days south. This place is called on the map Nichong gomba; the Dawo lamasery is called, however, Nitsung or Nintsung gomba, and its lamas are deemed a most riotous and dangerous set. In fact, the lamas of the three great lamaserics of these parts, viz. Zoch'en, Ch'ango and Dawo, are more soldiers than monks, being all well armed and well mounted. From Dawo we went to T'ai-ling (Gata in Tibetan), and then crossing a pass at the Hai-tzu-ahan, a splendid snow-clad peak at the head of a lovely valley, we descended the valley of the Che-ch'u to Tachienlu, which we reached in five days from Dawo, having come from Jyé-kundo in the remarkably short space of 23 days. I waited at Tachienlu 15 days for my luggage to turn up, but as nothing came I left for Ya-chau, whence I came down on a small bamboo raft to Kia-ting-fu, from which place a boat brought me here.

I made a survey of all the routes from Sining to Tachienlu with prismatic compass and aneroid, except from Kanze to Dawo, but the pundit's survey is very exact here, and it is only the names which require altering. During the journey from the Tsaidam to Jyé-kundo we had to endure a great many hardships, but they were much more endurable than the continual worry and apprehension of being turned back which we experienced between the latter place and Tachienlu, thanks to the unfriendliness of the lamas. Had I been dressed in European costume and not spoken Chinese and Tibetan, I believe I should not have reached further than Nam-ts'o, but I always wore Tibetan dress, and lived as the people did, on tsamba and tea. In fact, during

the whole journey I never used any European articles of dress or food. The work of surveying gave me great trouble and fatigue. I made my sketch on an approximate scale of four miles to the inch, and hope it may prove of service. Wherever I could I left the route followed by pundit A—K, so as to break new ground.

The Mongols of the Tsaidam are very imperfectly depicted by Prjevalsky, and they proved most interesting. The Dsassak of Barong Tsaidam and the Déba of Nan-ts'o spoke to me a great deal about the Russian traveller. The latter told me that when he reached the Dré-ch'u he would not cross in the skin boats, but wanted to make wooden rafts, so that he could get his camels across. It was a great mistake bringing these beasts to this country, as they are useless over the stony, uneven ground. Seeing he could not make rafts, he turned back, a singularly unenergetic step on the part of so experienced a traveller. When Szechenyi in 1880 tried to take this route from Sin-ning to Tachienlu, he was assured by the Chinese authorities that no route existed, and so had to give it up. Had I tried it from Tachienlu I should not have been able to travel along it, but I reached the country from the desert side. No one ever travels between Sin-ning and Tachienlu this way, save a few petty officials and a few Kamba traders going to Tankar. For administrative purposes all the Kamba from Jyé-kundo north are under the rule of the Chinese Amban at Sin-ning, those south of that point under the governor-general of Su-ch'uan. The Chinese of Kan-su call these people Hung-mao-tzu ("Redcaps"), the Su-ch'uanese *Man-tzu*.

Polyandry prevails among those leading a sedentary life, but not among the Drukpa; the explanation is that the soil capable of culture being very limited, the brothers in a family do not want to divide it, so they take one wife and live together, two or three wives or a wife for each being an impossibility while living together. One brother goes on trading expeditions, another looks after the live-stock, while the wife is general superintendent and councillor, making all purchases and sales for the family. The people living in tents, not cultivating the soil, have no reason to practise polyandry. Among the Tsaidam Mongols polyandry exists, but I am inclined to think that it is rather promiscuity than a real institution. I must now bring to a close my narrative. Should the Royal Geographical Society like it I will prepare a paper on the subject of my journey, and send the route sketch and my observations to enable the Society to work out a map. This, I believe, would prove of value and correct many errors on the existing maps.

GEOGRAPHICAL NOTES.

Stanley's March from Albert Nyanza towards the East Coast.—During the past few days public attention has been kept alive by the successive appearance in the daily papers of telegrams and letters of various dates relating to the rescue of Emin Pasha and his followers by Stanley, and the march of the large caravan from the Albert Nyanza to the missionary settlement of Mpwapwa, within 170 miles of the coast opposite Zanzibar. In our present issue we give the long and interesting letter addressed by Stanley to our Society on some of the geographical results of the first part of the journey, i. e. from Kavalli, on the south-western side of Albert Nyanza, to Uzinja, near Victoria Nyanza, together with Lieutenant Stairs' report to his chief on his attempted ascent of the snow-capped Mount Ruwenzori. The long absence of news since Stanley's departure from the Yambuya camp on the Aruwimi (August 28th, 1888) is now explained, by the length of time taken in his perilous return journey up the Aruwimi to the Albert, his long and tedious arrangements with Emin and his mutinous Egyptians, and his own serious illness of a month's duration at Kavalli. He reached the Albert on the 18th of January, commenced his march home on the 10th of April, was delayed immediately afterwards by his illness to May 8th, and arrived at Mpwapwa on the 10th of November. He is expected in England in the latter part of January.

Thoroddsen's Explorations in Iceland.—Mr. Thoroddsen, the active and well-known explorer of Iceland (his native country), made an excursion last summer into the region lying to the north-east of Mount Hekla, a district hitherto unexplored by scientific observers, and large tracts of which have never been visited at all. The results of this expedition, which will be found in a short memoir contributed by M. Thoroddsen to the current number of *Petermann's 'Mittheilungen,'* are of the highest value to the topography of the island. Starting from Galtalækur, west of Hekla, on the 12th of July, the traveller first explored the interesting volcanic stretch of country north of Torfa jökull, where he discovered three formerly unknown obsidian lava streams, and was able to ascertain that the masses of loose pumice-stone, which are distributed over a great part of South Iceland, come from the north-west spurs of the Torfa jökull, which consist for the most part of ligarite; a point hitherto undetermined. All the lower stretches of the Torfa jökull and Vatna jökull are covered with lava and ashes, but the substratum, as well as the mountain chains themselves, consists of palagonite breccie and tufa. The course of the important river Tungnaá approaches much nearer to the Torfa jökull than shown on existing maps. After crossing this river, the traveller visited the Fiskivötn, whence he made several excursions. The fish-lakes proper

are much smaller than represented on the maps. M. Thoroddsen was surprised to find that these lakes are crater lakes with very characteristic but pleasant surroundings, similar lake-groups in the interior lying as a rule between walls of glacial rubbish. One excursion led him across an extensive grassless sheet of lava to the lake Thorisvatn, which is much larger than Gunnlaugsson supposed, and should take its place as one of the largest lakes in Iceland. A point to which M. Thoroddsen directed special attention was the discovery of the sources of the three large rivers Skaptá, Hversfisfjót, and Tungnaá, hitherto supposed to rise from one glacier. The result of his explorations in this quite unknown region is that the Tungnaá springs in two branches from a large glacier, the edge of which, like a great bow, stretches across from the mountains south of Vonarskard to those near Fljótshöfði; the sources of the Skaptá lie about nine miles to the south, and those of the Hversfisfjót from nine to fourteen miles from the latter, so that there is no connection between them. Between the Tungnaá and Skaptá are three jagged mountain chains, and between the middle and southern of these the traveller discovered a new lake, narrow, but about 24 miles long: it extends nearly up to the edge of the Vatna jökull, and contains almost milky-white glacier water. Several other excursions were made by M. Thoroddsen, and the results of his summer travels will, he states, completely alter the map of the whole district to the north-east of Hekla.

The Waitomo Caves, New Zealand.—In a report to the Surveyor-General of New Zealand, Mr. Thomas Humphries gives an interesting description of a visit which he and a small party made in June last to the Waitomo Caves, King Country, in the North Island of New Zealand. The Waitomo river, a tributary of the Waipa, which passes through these caves, lies about 85 miles south of Auckland in a direct line, though it is about 20 miles further by rail and road. The caves are about 10 miles from Otorohanga railway station. The country around is undulating. A quarter of a mile before the caves are reached, the Waitomo, of about 20 feet in width, is seen emerging from the side of a hill, under which it has meandered through limestone caverns of various sizes for about 20 chains. A light canoe can be taken along the river through the caves to within a few chains of its egress, where further progress is barred by the roof coming down to the water. At the entrance to the cavern the stream is eight feet deep. The natives have never had the courage to enter. The entrance to the cave, 30 feet wide and 20 feet high, is in the face of a cliff. It is beautifully arched, with numerous moss and lichen-covered stalactites. In a canoe the visitor is taken in, 90 feet from the entrance, and landed on a silt-covered beach. By the aid of candles, for all is now dark, he finds himself among ponderous stalactites, 3 feet to 6 feet thick, reaching from the roof, 20 feet high, to within a foot of the ground. Everywhere,

all over the extensive and intricate caverns, are seen stalactites and stalagmites of immense size, in vast numbers, with marvellous beauty of form and colour. At one place the dark vault was studded with thousands of glow-worms, giving the vault the appearance of a starlit sky. Passing down the left bank of the stream for 140 feet over a large deposit left by floods, the party crossed it by means of a foot-bridge. From the entrance to the bridge the cavern averages 50 feet broad, and from 20 to 30 feet high. After crossing the bridge, a sharp turn to the right is made up a steep incline for a distance of 70 feet to the foot of a 10-foot ladder, which leads to a narrow passage four feet wide and 15 feet high, the entrance to the "Grand Cavern." Here is the bottom of the "Well," a narrow shaft running up to another series of caves over the lower ones, where it is again met with in the gallery above. The "Well" is four feet across, perfectly true as if made by human hands, and its sides beautifully marked with horizontal streaks, formed of laminated limestone. In the Grand Cavern is an immense mound of material evidently fallen from the roof. Beyond the Grand Cavern the roof rises and forms two domes, one 50 feet high. High up, 40 feet, is the entrance to another cavern. Beyond the dome there is a sudden fall, the roof lowering so much that the visitor has to stoop. The length of the Grand Cavern, at the end of which the stream is again met with, is 250 feet. It varies in width from 15 to 40 feet, and from 20 feet to 50 feet in height. Up to this point, the colour is a dull brown and a light yellow; but in the upper galleries, 30 feet above, there are alabaster and Parian-marble-like scenes of unsurpassed loveliness. Twenty feet above the Grand Gallery is the "Organ Gallery," from the appearance of the great stalagmitic mass 150 feet from its entrance, rising tier upon tier, like the front of an organ with marble pipes. From the Grand Gallery the Main Gallery above is reached by a 25-foot ladder, and 60 feet along it the "Well" is reached. Here it is 12 feet in diameter, with smooth sides of hard limestone, and the sound of moving water below. This is 45 feet above where it was first seen. Fifty feet along from the upper Well is a "Fairy Grotto," and through an archway 30 feet in length the "Banquet Chamber" is reached, where the surveyor and his friends found a hot dinner had been provided by the natives who own the caves. At the end of this chamber is the White Terrace, a stalagmitic mass rising in a series of terraces. From this the upper entrance to the caves is reached, high in a wooded cliff, 60 feet above and directly over the lower entrance. Mr. Humphries describes in glowing terms other galleries and caves, but this may suffice to show that, notwithstanding the destruction of the Rotomahana Terraces, New Zealand has still plenty of wonders.

Geography at Oxford.—Mr. H. J. Mackinder, Reader in Geography at Oxford, reporting progress this term, informs us that he has just finished the delivery of five lectures on the Historical Geography of the British
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Isles, which, besides many occasional students, have been constantly attended by 50 members of the University, being the highest attendance he has yet had. The University has granted him out of the Common University Fund, 100*l.* for the purchase of diagrams and materials necessary for the illustration of his lectures.—Mr. Mackinder has besides, this autumn, delivered a course of four lectures on the Teaching of Geography, at the College of Preceptors in Bloomsbury Square, at which there has been an average attendance of nearly 400 teachers, male and female, from Public, High, and Elementary Schools.

Subject for our Next Meeting, December 9th.—The Report of Sir William Macgregor on his journey to the summit of the Owen Stanley Range, New Guinea, will be read at the Evening Meeting of the Society, December 9th. After the paper, Mr. A. P. Goodwin, a member of the expedition, will exhibit his series of lantern slides illustrating the scenery, natives, &c., of the country passed through.

Obituary.

Commander T. F. Pullen, R.N.—News of the death, by malarial fever at Bonny, of Commander Thomas F. Pullen, R.N., has just been received. Our late colleague came of an old naval family; his grandfather, father, and uncles having rendered, as naval officers, hard and useful services to their country in every quarter of the globe. His father, the late Captain J. C. Pullen, R.N., whom he only survived a little over twelve months, was an old Arctic man, having served in the expedition of 1852–4, in search of Sir John Franklin. His uncle, the late Vice-Admiral William Pullen, rendered valuable services as a surveyor, especially in Australia, where he discovered the mouth of the Murray river: later, he was employed in laying the electric cable connecting India with England, and was his brother's senior officer in command of the *North Star*, during the Arctic expedition before-mentioned.

Commander Pullen was born in 1851, at Plymouth; and in 1862–3 was sent to the Royal Naval School at New Cross. Here, in June 1865, he won the extra cadetship which had been sent to the school for competition by Admiral Grey, and in December 1866 left the *Britannia*, after completing his course of instruction with great credit.

After serving as midshipman in vessels on the Pacific station, and in the flying squadron, he as sub-lieutenant joined H.M.S. *Shearwater* in July 1872, and served in her until 1875, in the Mediterranean and East Coast of Africa surveys. During this time he did especial service by volunteering to accompany Vice-Consul Captain Elton on his dangerous mission in connection with the slave trade from Dar-es-Salaam inland to Kilwa. The result of this mission was the discovery of a new slave route, rendered necessary to the Arab dealers after Sir Bartle Frere's mission, and the release of over one thousand slaves, thus striking a heavy blow at the traffic. Whilst on this expedition Lieutenant Pullen added considerably to the knowledge of the geography of this region.

In 1875, he was placed in charge of the survey of Jamaica, in command of H.M.S. *Sparrowhawk*, where he served from 1875 to 1880. In 1881 and 1882, he

was employed on the Red Sea and Delagoa Bay surveys, and the second transit of Venus.

In 1883, the Colonial Office required the services of an officer to act as Senior British Commissioner to determine the boundary line between British and French possessions near Assinie on the West Coast of Africa, and Lieutenant Pullen was detailed for this mission. He was successful, and in 1884 went as Special Commissioner from the Governor-in-chief to the king of Aowin, on the western border of Ashanti. He succeeded in re-establishing the Protectorate, negotiated by Sir Charles MacCarthy in 1822, but which had lapsed since his visit. He was then ordered to Prahsue, to determine its position, but this was not effected in consequence of sickness by blood-poisoning. This work on the West Coast was the most difficult and arduous task that Lieutenant Pullen ever had to perform, and was carried through by him with the greatest discretion, tact, and zeal, in the face of overwhelming difficulties. He suffered terribly from fever, but continued to perform his duties even when so ill that his orders were given as he was carried in his cot.

In 1884, he was placed in charge of the survey of New Guinea, in command of H.M.S. *Lark*. He was particularly successful during this period (as indeed throughout the whole of his frequent dealings with uncivilised races) in his intercourse with the natives. As one of his men remarked when speaking with admiration of the way in which Lieutenant Pullen managed the formidable natives of New Guinea, "He always kept his word with them, and they knew it." His health here also suffered much from fever. The doctor of the ship was the first to be prostrated, and had to be sent to Sydney; the entire charge of the sick after this falling on his shoulders.

In February 1888, Lieutenant Pullen received the command of the *Stork*, in charge of the survey on the East Coast of Africa near Zanzibar, including the Anglo-German boundary lines both north and south. On his way to his station he succeeded in finding, under circumstances of great peril, in a gale of wind, a dangerous rock (the *Avocet Rock*) in the track of shipping in the Red Sea, which had eluded search for a long time. Two vessels had struck on this rock, but in consequence of the several fruitless searches that had been made for it, it was considered to be a myth by some, though a source of considerable anxiety to those most frequently using this route. Shortly after this Lieutenant Pullen received his promotion to the rank of commander.

Whilst on the Zanzibar coast, during the period of the late blockade, he performed excellent work in the elucidation of politico-geographical disputes. Particular mention may be made of the fixing the course of the Belasoni Canal, a small but important work connecting the rivers Tana and Usi, which was claimed by the Germans. But Commander Pullen, "with his well-known minute and scientific accuracy of observations and deductions" (*vide* Colonel Euan-Smith's Report to the Foreign Office), placed beyond doubt the fact that this canal is within the limits of the British Concession. For these services—duly reported by Colonel Euan Smith, Consul at Zanzibar, to the Foreign Office—in April last, Commander Pullen received the thanks of Lord Salisbury.

At the Cape of Good Hope, in May, he was relieved of his command, and directed to proceed up the West Coast, taking advantage of the recent completion of a telegraph cable by the African Direct Telegraph Company, to fix the exact longitude of several places on the coast. In order to better fit himself for his work, and taking advantage of a slight delay awaiting the completion of the cable, he spent some weeks at the Observatory at Cape Town, with Dr. Gill and his assistant astronomers, "laying up" (he wrote) "stores of information—and each day bringing out

more clearly the important nature of the work on which I am about to proceed ; and also of the nicety to which the work has to be carried, the points of time to which we go are infinitesimal, and the results are wonderful."

He started up the coast early in August, in H.M.S. *Peacock*, and had just completed his task, when he was directed to undertake the survey of the rivers falling into the Río del Rey in the Bight of Benin—as the Colonial Office wished to have the exact determination of boundaries in those parts. It was whilst at Bonny, preparing for the commencement of this work, that Commander Pullen fell a victim to the foe he had so often met at the call of duty and overcome before, on Sunday, November 3rd. The information yet received has been by telegraph, but we are informed that the evening before the fatal attack he endeavoured to take observations, but was laid low at 8 p.m., and did not recover consciousness until he passed away at six the next morning. So that it may truthfully be said, he died with his sextant in his hand.

REPORT OF THE EVENING MEETINGS, SESSION 1889-90.

First Meeting, 11th November, 1889.—The Right Hon. Sir M. E. GRANT DUFF, G.C.S.I., &c., President, in the Chair.

PRESENTATIONS.—*Ernest Gardner, Esq. ; E. W. Parsoné, Esq. ; J. C. Semple, Esq.*

ELECTIONS.—*Alexander Chivas Adam, Esq. ; Captain Robert James Watt Bristow ; Roland Chambers, Esq. ; Philip Howard Davis, Esq. ; James Alexander Liebman, Esq. ; Captain Alfred Busil Loder ; William Alexander Mackinnon, Esq., C.B. (Director-General of the Army Medical Department) ; Captain John Seymour ; Joseph H. Theakstone, Esq. ; Rev. John Verschoyle.*

The new Session was opened by the PRESIDENT with a few words of congratulation on the prospects of the Session now opened. With regard to the geographical events of the recess, he said that whatever of importance had happened since the Society last met had been placed before the members in the monthly 'Proceedings' of the Society. News of the greatest interest had been received by telegraph during the past few days with regard to the safety of Mr. Stanley and Emin Pasha and the march of their large caravan through unexplored regions on their way to the coast. Before the formal business of the evening commenced Mr. Freshfield would briefly explain, with the assistance of the large wall-map, the route taken, as far as it could be gathered from the telegrams which had appeared in the newspapers.

ROUTE OF MR. STANLEY AND EMIN PASHA.

Mr. D. FRESHFIELD said that he regretted it was impossible for him to add anything to the information already published, which was all the news that had been received in England up to date. Nor could he hope to add anything material in the way of elucidation to the comments that had already appeared in the press. He thought, however, that it might be interesting to the audience to have their attention recalled to the letter of Mr. Stanley which was read before the Society in April last. That letter, as he had pointed out after reading it, contained in its concluding sentences an indication of the geographical problems which had fixed the explorer's attention, and was a key to the line of his future march. Mr. Stanley there expressed himself curious as to the country south of the Albert Nyanza and the lake known

hitherto as the Luta or Muta Nzige, which he when writing believed to belong to the Congo system. He had now corrected his own impressions, and shown that it served as a reservoir to the south-western sources of the Nile, and poured its out-flow through the Semliki river into Albert Nyanza. One small point in connection with Mr. Stanley's recent despatch which had perplexed some was cleared up by reference to earlier letters. He referred to his *third* visit to the Albert Lake. This was explained by the fact that after first reaching it he made a journey to Ibwiri and back, thus twice visiting its shores.

Mr. Freshfield went on to point out on a large diagram the direction of Mr. Stanley's march from the Albert to the Victoria Nyanza, as indicated in the recent telegram. It was evident that the size of the new lake, or Muta Nzige, had been greatly exaggerated on recent maps. There was some room for doubt as to the manner in which Mr. Stanley had marched "along three sides" of it. According to the order of local names given, it would seem that he had struck the western shore, and passed round the northern bay to the eastern shore. Apart from the names, it would appear more natural to imagine that he had passed from the northern round the western and the southern shores. But a few weeks would settle these questions of detail, and a very few months, it might now be confidently hoped, would bring back the explorer himself to answer the innumerable questions of interest raised by his wonderful journey.

The following paper was then read:—

"The Island of Cyprus." By Lieutenant-General Sir Robert Biddulph, G.C.M.G., late H.M. High Commissioner for Cyprus (*ante*, p. 705).

Second Meeting, 25th November, 1889.—The Right Hon. Sir M. E. GRANT DUFF, G.C.S.I., &c., President, in the Chair.

ELECTIONS.—Philip Badcock, Esq.; James Baker, Esq.; William Russell Bowker, Esq.; W. Butters, Esq.; William Edward Chambers, Esq., J.P.; Walter Owen Clough, Esq.; John Henry Cockledge, Esq.; Naphthali Herz Cohen, Esq.; William Corder, Esq.; William Alexander Duncan, Esq.; Sir Gilbert Clayton East, Bart.; Thomas Henry Evans, Esq.; James Henry Ewart, Esq.; Reginald Gallop, Esq.; George H. Garrett, Esq.; George Fred. Lee Giles, Esq.; Reginald W. Granville-Smith, Esq.; John Thomas Hamilton, Esq.; Major-General John Crosland Hay, C.B.; Major-General George Hutchinson, C.B., C.B.I.; James Alexander Hutchison, Esq.; Captain Hugh Milbourne Jackson, B.E.; William Richard Jones, Esq.; Captain C. Keith-Falconer; Professor W. C. Kernot; John Herbert Knowles, Esq.; George Robinson Lees, Esq.; Rev. Wilfred N. Leeson, B.D.; Chas. S. Levy, Esq.; James M'Carthy, Esq.; Alvan Millson, Esq.; Hugh Mordaunt, Esq.; Captain F. Mosenthal (4th Batt. P.W.O. Regiment); Alfred G. Nash, Esq.; J. F. Needham, Esq.; William Henry Odlum, Esq.; A. W. Paul, Esq., C.I.E.; John William Payn, Esq.; Charles Watrons Rogers, Esq.; John Ryle, Esq.; Henry Sanilbach, Esq.; Dr. Hans Sauer; Dr. Aurd Schultz; John Henry Scrutton, Esq.; William Sherriff, Esq.; Captain Algernon Eric Smith (1st Life Guards); Rev. Lewis Arthur Smith, M.A.; John Stuart, Esq.; Henry Waymouth, Esq.; J. M. Walker, Esq., M.A.; William Miller Walters, Esq.; Harrison Fraser Watson, Esq.

The paper read was:—

"The Bahrein Islands, Persian Gulf." By J. Theodore Bent, Esq.

Will be published in the No. for January 1890.

On the conclusion of the paper, the Secretary, Mr. Douglas W. Freshfield, read

extracts from the letters of Mr. H. M. Stanley and Lieutenant Stairs, received that day from Zanzibar through Sir William Mackinnon, Bart. The letters are given entire, *ante*, p. 720.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—October 12th, 1889: **BARON VON RICHTHOFEN** in the Chair.—Dr. Warburg spoke upon his journey of botanical exploration in Formosa in the spring of 1888. From Amoy, the coast-centre of commerce with Formosa, the voyage across to the island can be made by two lines of steamers, one going to Tamsui, more correctly named Hobe, the port of the northern capital, Taipefu; the other to Amping, the port of Taiwanfu. Besides these there are two treaty ports, Takau and Kelung, which are open to trade. Not one of these four harbours can be described as specially good. Amping is an open roadstead, and ships have to anchor two miles from the shore. Takau possesses a good harbour-basin, but it can only be approached by small vessels. Tamsui is simply the estuary of a river, shut in by a bar, and is also accessible to small vessels. The harbour of Kelung is small; it has a fairly good anchorage, but is not sheltered from the north-east winds. At Tamsui there is, in addition to the English consul and the custom-house officials, a most important personage, Dr. Mackay, Superintendent of the Canadian Presbyterian Mission, one of the oldest settlers, and the man best acquainted with the country, who has achieved great success among the half-civilised tribes of North Formosa, the so-called Pepokwans. The latter term is not confined to any particular race, or even to the inhabitants of the plains, but includes the mountain population, so far as it has come under Chinese influence. The uncivilised inhabitants of North Formosa are called Chinwans. Above Tamsui, up-stream, there was, until recently, only one larger town, viz., Banka, where, as long ago as thirty years, some 40,000 Chinese lived. With the increasing preference in America for the green tea of Formosa, European firms attempted to settle in Banka, which is in close proximity to the tea-producing districts, but they were not allowed to do so. They, consequently, established themselves in the neighbouring fishing village of Swatutra, which quickly grew to be a town. Later on, under the influence of Mackay, the jealousy and animosity of the people of Banka was appeased. By the decree of the Governor of Formosa, General Lui Ming Chuang, one of the most important Chinamen of the present day, and the brave defender of Formosa against the French in the year 1884, there has arisen between these two places a new town, with quite a European aspect, with broad streets and brick-built houses provided with arcades. That the authorities at Peking have hitherto placed no obstacle in the way of the general's magnificent works of reform appears to be due to the fact that at Peking Formosa is regarded as an outpost well fitted for experimenting in a harmless way with such reforms. Ming Chuang has been instrumental in connecting Formosa with Fu-chau by means of a cable from Tamsui, also Tamsui with Taipefu, Kelung with Taipefu, Taiwanfu with the Pescadores, and recently a line through the whole length of Formosa, from Taiwanfu to Taipefu. A difficult line of railway, with three iron bridges and a long tunnel, between Taipefu and Kelung is approaching completion, and another between Taiwanfu and Taipefu has been commenced. At Kelung extensive fortifications have been erected, also at Takau. At Taipefu an arsenal and cartridge factory have been built. These costly undertakings have naturally occasioned the introduction of new taxes and state monopolies, in consequence of which there was a riot among the colonists, which was put down by the military. In spite of the best intentions, the Governor has not yet succeeded in removing the

chief evil from which the administration of the country is suffering, viz., the corruption among the officials. The production of the coal mines of Kelung has increased very quickly, although the working is still a very primitive one. The output in 1888 amounted to 40,000 tons. In the lower districts the relations between the wild hill tribes and the Pepokwans are very unsatisfactory. The inhabitants in many parts can only venture to engage in tilling the fields with weapons in their hands. The graves of the slain are frequently met with; the savage hillmen cut off the heads of their victims and carry them away as booty. The traveller made an excursion to the South Cape, where, since the erection of the lighthouse, which was completed in 1883, and stands 235 feet high, very good relations have been established with the natives, so that it is now possible to go unarmed among the Paihwans, Amias, and even the Kuluts, who in earlier days were so much feared. The cost of the lighthouse, with its iron plating half-inch thick, and its equipment of two Gatling guns, was 60,000*l*. Its erection was due to the action of three Europeans, especially of Mr. Taylor, who is an excellent authority on South Formosa. It is just in those parts where the Chinese administration ought to have most influence, viz., at the posts along the so-called military roads, that life and property are specially unsafe, although even in these districts, European officials, knowing how to combine justice with severity, would easily bring about a better state of affairs. The great difference between the conditions of vegetation in the north and in the south of Formosa is striking. While in the north, pastures, alders, oaks, pines, peach and mulberry trees, camphor, tea, and the rice-paper tree (*Arabis papyrifera*), from the pith of which the well-known rice-paper is manufactured, meet the eye—these trees hardly appear in the south of the island; on the other hand, there is a preponderance of papayas, betel-pepper (the betel palm is distributed all over the island), giant bamboos, sugar-canes, turmeric, also tropical and South China plants. Throughout the island the wild date, sugar-canes and liquidambar trees flourish. Very remarkable also is a pure acacia with non-pinnate leaves, allied specimens of which are confined to Australia and the South Sea islands, south of a line from the Sandwich Islands, New Britain, and Timor. The presence of this tree, taken in connection with that of a kind of opossum, of the existence of which the traveller was informed at the South Cape, throws a new light upon the possibility of an earlier connection of the island with the Philippines, although otherwise the fauna points to the contrary. With regard to the ethnological conditions, the skull hunt, blood money, reverence for ancestors, club-houses for young men, and other institutions, point to an immigration from the south, and the mixture of Malay and Polynesian blood is plainly recognisable. That the Negro or Papuan races have contributed to the composition of the present population appears to be very doubtful. A caste system does not exist, neither pride of birth nor race-hatred; the aborigines of the hills have intermingled with the Chinese, just as at the present time they descend from the hills to the Pepokwans and occasionally mix with them; but nowhere did Dr. Warburg find tribes with flowing hair, and the blank spot on the map of Formosa between Doddrange and the snow-glistening Mount Morrison is too small to hide within its compass the completely unknown remains of Papuan races. Meanwhile the traveller is certainly surprised to meet, in North Formosa, with a heterogeneous type, with high nasal bridges, almost aquiline noses, slim, relatively large figures, which reminds him of Liukiu and Japan, the custom also practised earlier among the inhabitants of Taiwanfu, of interring the bones after the corpse has been exposed for three years upon a scaffold, points to northern relations with Korea and Liukiu.—Professor Partsch read a paper on the principal range of the Central Apennines. Of the old Tyrrhenian continent composed of primary rocks and palæozoic strata, the only remnant in the north is the Apuanian Alps, and in the south, the mountains of

Calabria. Between the latter, the heart of this continent has gone to wreck, and a sea basin, 12,000 feet deep, has taken its place. The only complete connection now remaining is the mighty girdle of limestone mountains which lay around the sunken Tyrrhenian mountain centre, the Central Apennines. It is possible to determine with great certainty the line of the natural boundary of the Northern and Central Apennines. The former, consisting throughout of older tertiary and the most recent chalk formations, sand-stone and marl-slate, shows numerous gaps of gabbro and serpentine, the roundish tops of which, with their arid, scantily wooded surfaces, stand out from afar in contrast with surrounding verdure. The gently undulating main crest forms the well-defined watershed, and slopes precipitously westwards down to longitudinal valleys of considerable size, while the eastern declivity, cut by numerous transversal valleys, slopes gently to the plain of Emilia. South of the saddle, hardly 2500 feet high, with which the Alpe della Luna terminates, another mountain system of quite a different character commences, with the Monte Nerone (5007 feet) which is composed of sharply-cut, light-coloured, hard limestone rocks of the Jura and chalk formations, which project in isolated peaks from the principal mountain mass. Immediately to the north of this boundary line, which leads through the Metaura Valley by way of S. Sepolcro into the upper valley of the Tiber, and continues over lower ridges to Arezzo, lies the last great block of serpentine; the latter rocks are entirely absent in the Central Apennines, and appear again in the Southern Apennines at Lago Negro. The sharp projection of the great ellipsoidal mass of chalk—Jura—and Trias lime out of the broad socle of more recent formations, is characteristic of the Central Apennines. The northern spurs of the mountains show the simplest composition; the limestone strata of Monte Nerone, Monte Catria, and Monte Cucco, the heart of which is formed by enormous unstratified limestones of the Trias formation, is symmetrically overlaid by a covering of only partially formed Jurassic strata. The multiplicity of the surface formations is chiefly caused by the strong contrast of the two uppermost strata of chalk formation, since in one place the middle limestones appear in rugged, torn walls and ridges, in another these masses turn into marl, and becoming covered with grass, disappear. The rural charm of these regions has disappeared to a very considerable extent, in consequence of the reckless disafforestation which has taken place here within the last twenty years. The principal commercial route across this part of the mountains lay, even in ancient times, along the Via Flaminia, the construction of which was commenced shortly before the second Punic War (220 B.C.), in order to connect the first territorial acquisitions in the plain of the River Po more closely with the centre of the empire, and it has remained the chief means of connection between Rome and the Trans-Alpine provinces. The most prominent point along this road is the Furlo Pass, through which winds a stream of considerable size, between walls 1650 feet high. At the entrance of the pass the road is only 35 feet above the level of the stream, and it preserves the same level, while the river hurries downwards in a series of rapid descents to the bottom of the ravine. The rocks here and there, falling precipitously down to the river, leave no room for a road, and the Romans excavated a tunnel 100 feet long, 18 feet broad, and 16 feet high, the sight of which even to-day excites admiration for this enterprise of the ancients. On the north side of the tunnel every mark of the chisel remains sharp and clear, while on the south side the drift sand carried thither by the wind, has polished the surface. Besides the tunnel, the road, with its original foundation, is still in a state of complete preservation, and affords an exceptionally good opportunity for measuring the eroding activity of the river for the least 2000 years. Bearing carefully in mind the remains of the different periods of construction, and confining one's observation to the original stone slabs put together without mortar, it is seen that the deepening of the river bed at the entrance of the

ravine has not yet reached $3\frac{1}{2}$ feet in the 2000 years. This is an astonishingly small result for a rapid stream, which, when swollen, has a depth of 30 feet. South of the Esino Valley the mountain features are clear and simple; two parallel limestone ranges, of which the westerly appears as a continuation of the Catria Range, and the eastern presents, in Monte S. Vicino, a bell-shaped summit, enclose a depression filled with gently rounded tertiary hills, in which here and there, as at Fabriano, the traces of sea basins may be recognised. The more important towns lie partly along the rivers, which have cut into the diluvial conglomerate, and partly on commanding elevations, like the ancient Camerino. In the south follows then the inhospitable Sibilla Range, at the foot of the western slopes of which extends the high valley of Castelluccio, rich in meadow lands, but watered only by deeply sunk watercourses. It is a great synclinal, out of which the mesozoic strata ascend in regular stratification westwards to Monte Ventosa, and eastwards to Monte Vettore. Above the ridges the strata break off sharply, so that at the foot of them the oldest strata of the mountains, the middle limestones of the Trias, come into view. It is thus an immense upthrow at least 6500 feet high. The great ridge thus formed extends along the whole eastern slope of the Sibilla Range, and is the reason why the range, viewed from the east, produces a much greater impression upon the beholder than from the west. The rugged eastern front is broken up by steep mountain spurs into the three valleys of the Ambro, Tenna, and Aso, which lead up into wild corners of the mountains filled with detritus. The highest ravine, which is only open towards the north of the Aso valley, overshadowed by the Monte Vettore (8004 feet), and the Monte di Tretara (8126 feet), shows most distinct traces of former glacial action, which can be recognised from the snow fields still existing, and a succession, extending down to an altitude of 5970 feet, of small ponds and lakes, dammed up by terminal moraines, and also walls of rubbish. The mass of the Gran Sasso Mountains shows a somewhat complicated construction, in consequence of the great "twists," which have here taken place. The Gran Sasso range, undoubtedly the Mons Friscellus of the ancients, makes the greatest impression when seen from the north east, i. e. from Teramo. The spurs of the mountains recede with varying height and gentle crest-line, and increase the effect of the rugged tower of rock which forms the central part of the range, the middle of which is sharply indented by the Portella, and by the deep furrow of the Arno valley leading up to it. From Isola (1378 feet), the spectator overlooks the valley, $4\frac{1}{2}$ miles long, the back-ground of which is closed up by the precipitous wall of Monte Corno (6500 feet). Sparsely distributed oaks and vines, as well as dull-green olives, clothe the humid valley up to about 2000 feet. Above the corn-fields of the mountain slopes, there follows a belt of green bush woods up to 5500 feet, immediately above which rises the clear wall of Monte Corno. Professor Partsch was fortunate enough to discover in the Arno valley, from 5400 feet upwards, traces of former glacial action, moraines, &c. Most distinct traces of a former ice-covering are exhibited in the valley of the Venaquaro, the highest part of which contains, even at the present time, perpetual snow-fields. Further explorations will undoubtedly reveal numerous other indications of a similar kind. The Central Apennines afford but scanty means of subsistence to the fairly thick population; mining, with the exception of the brimstone pits of Cabernardi, is not carried on. It is only the industries of cattle-breeding and vine-culture which yield a surplus over the home consumption, to the realisation of which the exclusiveness of the country, and the lack of harbours, offer great obstacles. The low rate of wages causes the periodical migration of the rural labourers to the Agro Romano, whence they often bring back fever as the only result. Under a government which failed to do its duty, it was only too natural that these poor mountain folk should grow unruly and merge into brigandage. The

firm measures of the present government completely stamped out the disorder twenty years ago, and the once notorious district is so safe that the solitary traveller can pursue his way in perfect security. Everywhere in the towns it may be readily perceived that the people are beginning to work their way up. The breeding of silkworms and silkweaving are making fresh progress. The growing prosperity promotes works in the public interest; slaughter-houses, aqueducts, &c., have been erected, the street paving is improving, and the attention of the towns is being directed to foreign trade; so that in many small market-towns, such as Urbino and Pergola, there are surprisingly good inns.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian R.G.S.*)

[*Alpine.*—The *Alpine Journal*, Vol. XIV. (August 1888 to November 1889).

In our last number we recorded the death of the first editor of the *Alpine Club's* publications, Mr. John Ball. Here it is our duty to notice the retirement of the last, the Rev. W. A. B. Coolidge, who succeeded Mr. Douglas Freshfield in 1880. During this long term of office Mr. Coolidge, who is well known not only as the most persevering of *Alpine* explorers, but as one of the first living authorities on all questions of Swiss history and bibliography, has not only maintained but added to the reputation of the '*Alpine Journal*' as the "record of mountain adventure and scientific observation" its founders projected. His sedulous care has made the journal as remarkable for minute accuracy as for stirring tales; and, while completing his task of editorship, he is adding to the obligation all mountaineers are under to him by superintending the production of a complete index to all the publications of the *Alpine Club*, comprising, with '*Peaks, Passes, and Glaciers*,' seventeen volumes.

The volume completed last month contains, besides *Alpine* papers of the usual type, three valuable chapters on "The Growth and Sculpture of the Alps," by Professor Bonney; notes on "Sanburn," by Dr. Bowles; and on "The Effects of Lightning on Crystalline Rocks," by Mr. Eccles; papers on Norway, Alaska, and on the Kahlumbe Mountains, South Africa, with an original map and illustrations, by Mr. A. H. Stokes; and on the Kabyle Highlands in North Africa, by Mr. F. F. Tuckett.

The Caucasus occupies a very large portion of the volume and this New Playground will perhaps fill a still larger space in the future records of the Club. M. de Déchy in the concluding number makes the most of the attractions of a new and comparatively accessible field for lovers of high places, the mountains of Bosnia and Montenegro. The volume is fully, though unequally illustrated, and contains also some valuable maps.

The *Alpine Club* may be congratulated on having proved in its fourteenth volume that its old members are as vigorous as ever, both with the pen and the ice-axe, and that some of its younger ones, while becoming more of travellers, are no less of mountaineers. It is to be desired that they may soon have time and opportunity to attack the Himalaya, where, above the snow-level, Anglo-Indian enterprise is apparently at a standstill.

— *Annuaire du Club Alpin Français*, Quinzième Année, 1888. Paris, Hachette, 1889.

In the *Annuaire* of the *Club Alpin Français*, Mont Blanc properly occupies the first place. M. Janssen, "*de l'Institut*," describes a scientific ascent, the object of which was to ascertain "if the rays and bands of the solar spectrum, recognised as proceeding from atmospheric oxygen, are exclusively due to our atmosphere" (p. 5). An interesting article on "A hundred years of ascents of Mont Blanc" follows. The Pyrenees, Algeria, the *Ægean* Sea are noticed. An article is

devoted to an elaborate account of the "Règle à éclimètre" of Colonel Goullet, an instrument which is said to have been found very serviceable for mountain work. The volume contains 700 closely printed pages. The illustrations are not so good as they might be. Paris ought not to allow New York to surpass her in a matter of art.

- *Jahrbuch des Schweizer Alpenclub. Vierundzwanzigster Jahrgang, 1888-1889, mit 'Beilagen.'* Bern, Schmid, Francke & Co., 1889: 12mo., pp. xi. and 576, illustrations.

The 24th *Jahrbuch* of the Swiss Alpine Club is as usual divided into several sections. One deals with a district set apart specially for the Club's activity, this year, in Canton Glarus. Professors Klein and Meyer von Knonau deal with its geology and history, Dr. Dübi contributes a monograph of the Vieschergrat. Of more general interest are the articles by Herr Becker and Dr. Forel on New Efforts in Chartography, and the periodical variations of Alpine glaciers. Herr Becker points out the difficulty young or uneducated eyes have in reading ordinary ordnance maps, and the advantages of more picturesque methods. He illustrates his remarks by reference to the map of Canton Glarus (1:50,000) issued with the volume. The Swiss Federal Staff have adopted a similar method in new maps recently published of the Oberland and the Ober Engadin. Dr. Forel issues his ninth report on Alpine glaciers, which appear at present to be in no accord, those in Dauphiné diminishing while those of Mont Blanc hold their own. The volume contains an excellent Alpine Bibliography for 1888, together with many minor articles.

- **Zsigmondy, [Dr.] Emil.**—*Im Hochgebirge. Mit Abbildungen von T. C. Compton.* Herausgegeben von K. Schulz. Leipzig, Duncker & Humblot, 1889: 4to., pp. xv. and 365. Price 25s.

This very handsome volume is a memorial to Emil Zsigmondy, a young Viennese doctor of brilliant promise, who was killed by a fall while climbing, unroped, on the southern cliffs of the Meije, in Dauphiné, in 1885. The book is made up by a selection from Zsigmondy's accounts of his Alpine ascents. He lived too late to be able to explore and map unknown fastnesses of ice and snow, like Von Sonklar and Payer, but not too late to take his part in the conquest of the last maiden summits of the Eastern Alps. The narrative of his summer wanderings is very readable. It deals for the most part with districts British holiday-makers have not yet invaded in force—the Orteler and Adamello, the Zillerthaler Ferner, and the byways of the Dolomites.

The illustrations to the volume are very remarkable. They are from sketches by an English artist, Mr. E. T. Compton, who has won himself a reputation amongst capable critics as the draughtsman most competent to deal with mountain form. Nothing is often so untrue to nature as a photograph, and many of the illustrations of scenery produced by photographic processes are gross libels. Mr. Compton has the knowledge and skill to draw his mountain outlines and details with a fidelity that satisfies the mountaineer or the scientific student, while he does not lose the magic of light and atmosphere. Some of his smaller sketches of incidents of mountain life are as good in their way as his pure landscapes. Those who, not knowing mountains, turn over these pages, can hardly fail to rise from them with a better idea of the world above the snow-line, while mountaineers will find their memories pleasantly refreshed and confirmed. On the whole, the volume is the most satisfactory illustrated work on the Alps issued since Mr. Whymper's 'Scrambles.' Mr. Compton's drawings have been successfully reproduced at Berlin, some by a process of photogravure, and others as very delicate woodcuts in the text.

EUROPE.

Zimmern, Helen.—*The Hansa Towns.* London, 1889: pp. xvii. and 369, with a map and illustrations.

This book forming one of the series, "The Story of the Nations," published by Fisher Unwin, serves to illustrate once more the dependence of history on geography. All the wealth and power of the Hansa merchants could not prevent or arrest the downfall of their League, when, with intolerable arrogance, they strove to maintain its monopolies in the midst of nations anxious to free themselves from foreign control. This brought about the end of the Steelyard in London, and the court of St. Peter's at Novgorod.

Their history is divided into three periods: the first treats of the development of associations of burgher merchants, originally banded together to rebel against the feudal system, the rise of the trading guilds upon the ruins of the knightly brotherhoods and the dawn of municipal liberty. In the second, some insight is given of the organisation and foreign relations of this powerful league, of its commerce with all parts of the world, of its Steelyard in London, and of its diets or assemblies at Lübeck. The third period, dating from the end of the fifteenth century, deals with the decline and fall of the Hansa power, and of the causes which prepared the way for its dissolution, notwithstanding the heroic efforts of Jürghen Wallenweber and his colleague, Max Meyer, the blacksmith-pirate and friend of bluff King Hal, to restore its waning fortunes; of the discovery of the White Sea route to Russia by the English; and of the extinction of the liberties of Novgorod by Ivan the Terrible; and, lastly, of the final blow struck at the League by the Thirty Years' War, when its ports and towns were besieged and occupied by the Imperialists. The Peace of Westphalia, in 1648, restored calm to Germany, but the League was to all intents and purposes dead; the glory of the Hansa towns had departed—a mere shadow of their former greatness remaining till, twenty-two years ago, Lübeck surrendered her privileges, and Hamburg and Bremen entered the German Zollverein in 1888. The publication of this volume, following so close upon the last-mentioned event, is opportune; and the lesson afforded by the history of the Hanseatic League deserves to be studied, not only because the British trading companies of the sixteenth and seventeenth centuries appear to have modelled their organisation upon it, but also for the remarkable revival of chartered companies at the present day.—[E. D. M.]

Lobley, J. Logan.—*Mount Vesuvius. A Descriptive, Historical, and Geological Account of the Volcano and its surroundings.* London, Roper & Drowley: 8vo., pp. 400. Price 12s. 6d. [Presented by the Publishers.]

This is a very complete monograph on the great volcano. After interesting chapters on the Neapolitan volcanic region, the surroundings of Vesuvius, and the mountain itself, Mr. Lobley traces its history in successive chapters from the earliest period down to the present time. Then follow chapters on the geology of Vesuvius, volcanic action, volcanic products, the minerals of Vesuvius, and the flora of Vesuvius. A variety of useful material is given in the appendix. The book is very fully illustrated, and should be consulted by all interested in the physical geography of the region.

Olsvæg, Viljam.—*Beyer's Guide to Western Norway, with the Coast-route to the North Cape. A Special Guide for Railway Trips to the famous Fjörd and Mountain Districts of Norway, with two maps and a panoramic view from Galdhøpig.* London, Philip & Son, 1887: 8vo., pp. 198. [Presented by H. L. Brækstad, Esq.]

This guide is compiled with great care and full knowledge. It contains much useful practical information as to routes, and will be found particularly useful to the tourist whose time is short, and who wants to be saved as much trouble as possible.

ASIA.

Ewart, W.—Settlement in India, and Trade with Central Asia. Speech of W. Ewart, Esq., M.P., in the House of Commons, March 23rd, 1858. London, James Ridgway, 1858: 8vo., pp. 18.

India.—East India (Progress and Condition). Statement exhibiting the Moral and Material Progress and Condition of India during the year 1887-88. Twenty-Fourth Number. London, Eyre & Spottiswoode, 1889. Folio, pp. 191. Price 1s.

Macintyre, [Major-General] Donald [V.C.]—Hindu-Koh: Wanderings and Wild Sport on and beyond the Himalayas. Edinburgh and London, Blackwood & Sons, 1889: 8vo., pp. xx. and 464. Price 21s. [Presented by the Author.]

Although General Macintyre's extremely interesting volume is mainly concerned with sport, it will prove of service to the geographer on account of the frequent notes which he gives on the aspect and the inhabitants of the various regions in which he sojourned. He visited many out-of-the-way places on the Tibetan border, and his observations both in geography and natural history are frequently of original value. As a sporting narrative it is unusually trustworthy, and the numerous excellent illustrations add to its value.

McLean, M.—Echoes from Japan. London: Passmore and Alabaster, 1889: 12mo., pp. 315, map and illustrations. [Presented by Miss McLean.]

AFRICA.

Casalis, Eugene.—My Life in Basuto Land; a Story of Missionary Enterprise in South Africa. Translated from the French by J. Brierley, B.A., 1889: the Religious Tract Society: sm. 8vo., pp. 293. Price 5s. [Presented by the Religious Tract Society.]

Reminiscences of the author's early life, and of his twenty-three years' missionary experiences in South Africa, from 1832 to 1855.

Dupont, Édouard.—Lettres sur le Congo. Récit d'un voyage scientifique entre l'embouchure du fleuve et le confluent du Kassai. Paris, 1889: pp. viii. and 724. 11 plates and 12 illustrations in text.

The officers of the Congo State have been accused, somewhat unjustly in our opinion, of having done nothing to enlighten the world upon the resources of their country. The work now before us, recording the observations of a Belgian man of science on the various aspects of nature as they presented themselves before him in the course of several months' travel on the Congo will, let us hope, do something to disarm hostile critics. Its author, Mr. Dupont, director of the natural history museum at Brussels, having obtained leave of absence from his Government, went to Africa in 1887 at his own expense, to study *de visu* the equatorial regions of the Congo and satisfy a desire cherished for many years of gaining a closer acquaintance with a country connected by so many ties with his own.

He landed at Boma, now the centre of government of the Free State, and proceeded thence by water to Matadi where navigation ends. Here he was provided with a few Zulu porters, an escort of Haussas and the impedimenta necessary for an expedition into the interior. Crossing to the right bank, he set out from the now abandoned station of Vivi. In pursuance of his object of studying the geology and other natural features he made short marches, keeping as near as possible to the river, and usually camping on its banks. Wherever insurmountable obstacles presented themselves to the passage of his caravan, he would, with two or three followers, after arriving at camp, make his way down stream, observing the strata, and connecting each day's work with the preceding. As a framework for his geological observations, he plotted his itinerary, and in this way, having visited parts of the river outside the usual track of Europeans, was able to correct the topography of existing maps. For instance, he points out two bends in the Congo between Yellala Falls and Pamun'gulu, instead of one as hitherto shown, and places the village of Vuuda on the

second elbow above Isanghila instead of the third—a position since rectified on M. Baumann's fine map of the Congo (*Bulletins de la Société de Géographie de Vienne*). The winter or dry season in these latitudes, chosen for this journey was favourable for geological investigations, as the lower Congo is then at its lowest and the rocks exposed to view. Numerous observations on these are recorded throughout the narrative, while the general results are summarised at the end of the book.

A few days were devoted to excursions in the neighbourhood of Isanghila, and three marches beyond this station our author crossed to the left bank, opposite the former Baptist missionary station of Bainesville, where the river flows in a majestic course two-thirds of a mile wide, between picturesque, well wooded banks. M. Dupont then proceeded to the large station of Lukungu (in 1883 the headquarters of the Livingstone inland mission), Manyanga and Léopoldville. From the last named station, where he found plantations of *chikwanga*, or manioc, and European vegetables flourishing, our author made an excursion to the mouth of the Kassai, and to Misuata in a native canoe manned by twenty Bangalas, placed at his disposal by Lieutenant Liebrechts, the commander of Léopoldville. Returning to this place, he retraced his steps to Manyanga on the left bank—the old station on the right bank, founded by Stanley, has been abandoned, owing to its unhealthy situation—and crossed the river into French territory. Here M. Cholet, the French agent, arranged an excursion for him, to the copper mines of M'boko Songho, 44 miles in a direct line north-west of Manyanga. This part of the journey, occupying 21 days, from the 9th November to the 1st December, is illustrated by a separate large-scale route map. The country passed through was found to be an elevated plateau, 1500 to 2000 feet above sea-level, much seamed by ravines and valleys, and watered by numerous streams flowing towards the Congo. A dense population was met with, as many as 16 villages having been counted at one place; but the attitude of the inhabitants was one of distrust towards the travellers, several villages had been deserted on their approach, the paths blocked, and numerous signs put up to show they were unwelcome visitors. M'boko Songho lies on a plain 400 metres above sea-level on the watershed between the Congo and Kwilu rivers. Its mines, three in number, yield copper, malachite, and iron; but only one was being actually worked. After visiting these mines, M. Dupont returned to Manyanga, and then continued his homeward journey via Lukungu, Isanghila, Banza Manteka, and Vivi to Boma, arriving at the last named place on December 23rd. Here he made another geological excursion into the country, north of Boma, and finally, on the 5th January, 1888, took his departure on foot for Banana. During his stay at Boma, he had the opportunity of conversing with the Governor-General, M. Janssen, who communicated some particulars on the administration of the State. These and the development of intercourse with the natives afford subject for an interesting chapter.

Turning to the scientific results, the author says the coast range or mountains of crystal are composed of Palaeozoic rock of common origin with the mountain masses of Europe and America. When their upheaval took place, the interior of Central Africa was a vast depression covered by water. In course of time the waters frayed themselves a passage by a deep cleft to the Atlantic, and the basin of the Congo took form and shape precisely in similar manner as the plains round Vienna after their superincumbent waters had burst through the Iron Gates into the Black Sea. M. Dupont found very few fossils in any of the rocks; those he did succeed in obtaining belonged to molluscs, approaching to living forms, though sufficiently distinct to be classed among those of the post-pliocene age. Our author's observations on the colour of the Congo water and the so-called laterite theory of Indian geologists as applied to the peroxide ferruginous deposits of the Congo are well worthy of attention, founded as they are on a careful study of these phenomena.

Chapter xx. deals with the distribution of the palm-trees, and is, in our opinion, the best part of the book. Particularly interesting are the facts detailed relating to the oil-palm (*Elaeis Guineensis*) and the *Borassus* or *rondier*, confused by Mr. H. H. Johnston, and after him by Mr. Stanley with

the Hyphæne of the lower Congo. To illustrate the subject more thoroughly, diagrams are introduced into the text showing the limits of distribution of the several kinds of these characteristic types of intertropical African vegetation. A chapter on the ethnography concludes this volume, which we venture to say will be found a valuable guide to the traveller in these regions, and supply the scientific world with highly suggestive matter for their studies. The maps and illustrations are good, and particularly the panoramic view of the left bank of the Congo from Isanghila, after a drawing by Lieutenant Roget.—[E. D. M.]

Gabon-Congo à l'Exposition, 1889. Paris, S. Heymann: 12mo., pp. 28, illustrations. [Presented by the Author.]

Galton, Francis [F.R.S].—Narrative of an Explorer in Tropical South Africa, being an account of a visit to Damaraland in 1851, together with a Biographical Introduction by the Editor. Also Vacation Tours in 1860 and 1861, by Sir George Grove, D.C.L., Francis Galton, F.R.S., and W. G. Clark, M.A. London, Ward, Lock & Co., 1889: cr. 8vo., pp. xviii. and 320. Price 2s. [Presented by the Publishers.]

This volume, forming one of the 'Minerva' series of books, mainly consists of a reprint of the author's work issued thirty-six years ago under the title of 'Tropical South Africa.' It is, however, supplemented with an appendix consisting of short extracts from various sources, giving an outline of the subsequent history of the peoples and individuals spoken of in the book. An index has also been added. The volume is illustrated with a map based on the present state of our knowledge of Damara and Ovampo lands, and the adjacent districts. It also contains a portrait of the author, besides other illustrations.

Historia dē Minás 'Además Sagad Rei de Ethiopia. Texto Ethiopico publicado, traduzido e anotado por Francisco Maria Esteves Pereira. Lisbon, Imp. Nacional, 1888: 8vo., pp. 87. [Presented by H. E. the Portuguese Minister.]

Mercier, Ernest, Ancien Maire de Constantine.—La France dans le Sahara et au Soudan. Paris, Ernest Leroux, 1889: 8vo., pp. 68.

A most valuable work from a French point of view, written to dispel the public ignorance regarding the Sahara and the Soudan; to show their actual condition, and to indicate the measures necessary for implanting in them security and French influence. The work is divided into five parts:—I. Traditions, histoire. II. Description géographique. III. Mœurs des Sahariens. IV. Épopée des Médaganes. V. Voies et moyens de l'extension de l'autorité française sur le Sahara et le Soudan.—[R. L. P.]

Watson, [Major] C. M.—The Campaign of Gordon's Steamers. Published by the Royal Engineers' Institute, Chatham: 8vo., pp. 32. [Presented by the Author.]

This is an exceedingly interesting record of an episode of the Sudan war; it relates to the actions of the steamers which General Gordon sent to Matammeh to meet the English troops, and to give them a helping hand on the road to Khartûm. These steamers had to wait four months, and Major Watson's narrative is compiled from the daily journal of the officer in command, Nushi Pasha.

AMERICA.

[**Brazil.**—Guide de l'Émigrant au Brésil publié par les soins du Syndicat du Comité Franco-Brazilien pour l'Exposition Universelle de 1889 et rédigé sous la direction de M. F.-J. de Santa Anna Nery. Paris, C. Delagrave, 1889: 12mo., pp. 176.

[—] Le Brésil, par E. Levasseur (Extrait de la Grande Encyclopédie). Première Édition. Paris, H. Lamirault & Cie, 1889: 4to., pp. viii. and 86, map and illustrations.

[The above two works relating to Brazil, issued in connection with the Paris Universal Exhibition of 1889, were presented by Monsieur D. V. Cavilcanti de Albuquerque, Commissaire-Général du Brésil, through Mr. James Jackson.]

Monsieur Levasseur's work deals with the physical, political, and commercial geography of the country. A Bibliography is appended.

Bulkeley, Owen T.—*The Lesser Antilles. A Guide for Settlers in the British West Indies, and Tourists' Companion.* London, Sampson Low & Co., 1889 : 8vo., pp. 207, maps and illustrations. Price 2s. 6d. [Presented by the Publishers.]

Contains a description of the islands of the Lesser Antilles (including Trinidad), with their area and population; information for intending settlers; an account of the industries; the people; vegetation and animal life, and other matters of interest to the tourist and settler.

Canada: a Memorial Volume. *A Statistical and Descriptive Handbook of the Dominion.* Prepared under the authority of the Government of the Dominion and the various Provincial Administrations. Edited and Published by E. B. Biggar, Montreal. London: E. Stanford, 1889, 8vo., maps. Price 10s. 6d. [Presented by the Publisher.]

This work is intended to give such a description of the various provinces and territories of Canada that its progress, politically, commercially and industrially, may be more fully realised than hitherto. It is divided into ten sections, separately paged, and each treating of a particular subject. The first portion of the volume consists of a reprint of the handbook recently published by the Dominion Government. Following the general description of Canada, is an account of each province, giving a sketch of their various educational systems, their provincial and municipal governments, their physical features, trade, commerce, manufactures, agriculture; mineral, marine, timber and other resources, with miscellaneous facts and figures, prepared from official sources. A special section is devoted to a description of the North-west Territories, the great Mackenzie Basin, and the region around Hudson Bay. In the last section a sketch is given of some of the leading cities and towns of Canada, it also contains an account of Canadians abroad, Mr. Erastus Wiman's tribute to Canada, and a sketch of the island of Newfoundland. A general index concludes the volume.

Dinarte, Sylvio (A. d'E. T.).—*Innocencia.* Translated from the Portuguese and illustrated by James W. Wells, F.R.G.S. London, Chapman & Hall, 1889 : cr. 8vo., pp. xii. and 312. Price 6s. [Presented by the Publishers.]

This is a story of the Prairie regions of Brazil, by a Brazilian author, and is useful as giving a good idea of the character of the country and the characteristics of the people.

Evans, Patrick F.—*From Peru to the Plate, Overland.* London, Bates, Hendry, & Co., 1889 : 8vo., pp. 124. Price 2s. 6d. [Presented by the Publishers.]

The journey here described was made in 1884 by the author and the late Mr. Llewellyn W. Mostyn. The diary is the joint production of the two authors. The journey lasted from July 1st to September 7th. The route was from Lima to Mallendo by steamer; to Arequipa by boat, horse, and rail; to La Paz by train, steamer, and diligence; to Oruro, Potosi, Tupiza, Jujuy, and Salta on mule- and horse-back; to Tucuman by diligence; and to Buenos Ayres by rail and steamer. The narrative is interesting, but slight; Mr. Evans's notes on places rarely visited may be useful.

Montefiore, Arthur.—*Florida and the English.* London, Carr & Co., 1889, 8vo., pp. 28, map. Price 1s. [Presented by the Author.]

A sketch of Florida, its climate, soil and industries, with hints to the settler.

[North America.]—*Transactions of the Geographical Society of Quebec, 1886-1889* Quebec, 1889 : 8vo., pp. 264.

In a preliminary statement to this volume it is explained that want of funds has been the cause of the long delay in issuing any account of the work of this Society. This is to be regretted, as the Society is so favourably placed for doing good work. We are glad to learn, however, that owing to the liberality of the Quebec Government, the Society is now placed in a more favourable position,

and it is to be hoped it will be able in future to issue its publication at more frequent intervals. This volume contains a variety of interesting matter. There is a collection of all recent information on the mysterious Lake Mistassini; a paper on the Landfall of Cabot; an interesting paper on the Copper Indians, their customs, habits, and language; stray notes on Labrador and on the country lying south of Quebec, between the St. Lawrence river and the State of Maine; a study on the Mound Builder of North America; many documents concerning the winter navigation of the St. Lawrence; a paper on Belle-Isle.

[**Pennsylvania.**—Climatology of Pennsylvania. Extract from Annual Report of Thomas J. Stewart, Secretary of Internal Affairs of Penna., for the year ending 30th November, 1888. Harrisburg, E. K. Meyers, 1889: 8vo., map and diagrams. [Presented by the Franklin Institute, Philadelphia, Pa.]

[**Uruguay.**—Dirección de Estadística General. Anuario Estadístico de la República Oriental del Uruguay. . . . Ano 1887. Montevideo, 1888: 4to., pp. lv. and 668, map, plates, and plans.

Treats, among other things, of the population, commerce, navigation, education, railways, posts, and telegraphs of the Republic of Uruguay.

[—] La République de l'Uruguay à l'Exposition Universelle de Paris de 1889 par Honoré Roustau, Directeur du Bureau de Statistique Générale, Montevideo, 1889: 4to., pp. 124, map.

[—] De las Industrias y del Desarrollo Industrias en la República Oriental del Uruguay especialmente en Montevideo, por E. Wonne. Montevideo, 1889: 4to., pp. 127.

[The above three works relating to Uruguay, issued in connection with the Paris Universal Exhibition of 1889, were presented by Monsieur le Colonel Juan J. Diaz, Ministre Plénipotentiaire de la République de l'Uruguay, through Mr. James Jackson].

AUSTRALASIA.

Kennedy, E. B.—Blacks and Bushrangers; Adventures in Queensland. With Illustrations by Stanley Berkeley. London, Sampson Low & Co., 1889: cr. 8vo., pp. xii. and 312. Price 7s. 6d. [Presented by the Publishers.]

Mr. Kennedy, who has spent many months amongst the Queensland natives, had exceptional opportunities afforded him of becoming acquainted with their habits and customs, so that his volume, from an ethnological point of view, is of interest.

OCEANIA.

[**Hawaiian Islands.**—An Historical Sketch of Education in the Hawaiian Islands. By Hon. W. D. Alexander, and Alatau T. Atkinson. Published by order of the Board of Education of the Hawaiian Kingdom. Honolulu: 8vo., pp. 12.

[—] A Brief Account of the Hawaiian Government Survey, its Objects, Methods, and Results. By Prof. W. D. Alexander, Surveyor-General. Honolulu, 1889: 8vo., pp. 26.

[—] Catalogue of the Hawaiian Exhibits at the Exposition Universelle, Paris, 1889. Prepared for the Hawaiian Government. By John A. Hassinger. Honolulu, Hawaiian Gazette Co., 1889: 8vo., pp. 48.

[The above three pamphlets relating to the Hawaiian Islands, issued in connection with the Paris Universal Exhibition of 1889, were presented by Colonel Z. S. Spalding, Commissioner-General for the Sandwich Islands, through Mr. James Jackson.]

Moss, Frederick J.—Through Atolls and Islands in the Great South Sea. London, Sampson Low & Co., 1889: cr. 8vo., pp. xv. and 317. Price 8s. 6d. [Presented by the Publishers.]

An account of a seven months' voyage among the least frequented groups of islands of the western Pacific. The incidental descriptions of such places as the
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Union (Tokerau), the Ellice, the Gilbert (Kingsmill), and the Marshall Archipelagos, and the Carolines, are of great interest. The volume contains a map of the Western Pacific, a portrait of the author, besides illustrations of scenery, &c.

GENERAL.

[The 'Challenger' Voyage.]—Report on the Scientific Results of the Voyage of H.M.S. 'Challenger' during the years 1873-76, &c., &c. Zoology, Vol. XXXII. London, Eyre and Spottiswoode, 1889: 4to., pp. xiii., iii., 222, 31, and 92, plates. Price 25s. [Presented by the Lords Commissioners of Her Majesty's Treasury.]

Clarke, Hyde.—The Iberian and Belgian Influence and Epochs in Britain. London Spottiswoode & Co., 1888: 8vo., pp. 35.

— Examination of the Legend of Atlantis in reference to Protohistoric Communication with America. London, Longmans & Co., 1886: 8vo., pp. 48.

— The Picts and Preceltic Britain. London, Longmans & Co., 1887: 8vo., pp. 40. [The above four pamphlets were presented by Hyde Clarke, Esq.]

Darwin, Charles [M.A., F.R.S.].—Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H.M.S. *Beagle* round the World, under the command of Captain Fitz Roy, R.N. (From the corrected and enlarged edition of 1845.) Sixth edition. London, Ward, Lock & Co., 1889: 12mo., pp. xix. and 381. Price 2s. [Presented by the Publishers.]

This volume belongs to the series now publishing, entitled the "Minerva Library of Famous Books," to be edited by G. T. Bettany, and which will only include books of classical attainment. The present volume, which contains a complete reprint of the 'Voyage of the *Beagle*,' includes, as will future volumes of this series, a Biographical Introduction. It contains a portrait of Charles Darwin, besides a number of other illustrations.

Dictionary of National Biography, edited by Leslie Stephen. Vol. XX. Forrest—Garner. London, Smith, Elder, & Co., 1889: 8vo., pp. vi. and 445. Price 15s.

The following names, more or less connected with travel and discovery, appear among the notices in this volume:—Thomas Forrest, by Prof. J. K. Laughton; George Forster, by the same; James Forsyth, by G. Barnett Smith; Sir Thomas Douglas Forsyth, by E. J. Rapson; Robert Fortune, by G. S. Boulger; Henry Foster, by Gordon Goodwin; Luke Fox, by C. H. Coote; Sir John Franklin, by Prof. J. K. Laughton; James Baillie Fraser, by J. M. Rigg; Sir Henry Bartle Edward Frere, by Prof. R. K. Douglas; Sir Martin Frobisher, by C. H. Coote; John Fryer, M.D., by Gordon Goodwin; John Fullarton, by L. C. Sanders; Tobias Furneaux, by the Rev. Henry Furneaux; Thomas Gage, by Thompson Cooper, F.S.A.; and Allen Francis Gardiner, by G. C. Boase.

Encyclopædia Americana, The.—A Supplemental Dictionary of Arts, Sciences, and General Literature. Vol. IV. Neagle—Zunz. New York, Philadelphia, London, 1889: 4to., pp. 800, illustrations.

This work, which was commenced in 1882, is completed with the present volume. It is intended to supplement and accompany such works as the Encyclopædia Britannica, completing them in particulars where they appear deficient, and bringing down to the latest dates their statements and descriptions. The first volume corresponds to vols. i.-iv. of the above-mentioned work; the second to vols. v.-viii.; the third to vols. ix.-xvii., and this concluding vol. to vols. xviii.-xxiv. Large space has been given to articles on American geography, natural history, scientific research, &c. The following is a list of the principal geographical articles contained in this volume:—Nebraska, by F. Hess; Nevada, by J. C. Moore; New Hampshire, by the Hon. C. H. Bell; New Jersey, by C. W. Greene, M.D.; New Mexico, by R. W. D. Bryan; New York, by F. G. Mather; Niagara, by the same; North Carolina, by the Hon. K. P. Battle, LL.D.; Ohio,

by the Hon. J. M. Doane; Lake Ontario, by F. G. Mather; Oregon, by J. C. Moore; Pennsylvania, by W. H. Egle, M.D.; Prairie, by C. W. Greene, M.D.; Public Lands, by F. G. Mather; Rhode Island, by Rev. E. G. Robinson, D.D.; Shenandoah Valley, by J. Hunter; Slavery, by the Hon. A. J. Willard; Soils, by C. Morris; Stone River (Battle of), by J. Hunter; Lake Superior; Territory, by the Hon. A. J. Willard; Yellowstone National Park; Yosemite Valley. Descriptions are also given in this work of the leading towns and cities of the United States.

Frederickson, A. D.—*Ad Orientem*. London: W. H. Allen & Co., 1890 [1889], 8vo., pp. xiii. and 388. Price 21s. [Presented by the Publishers.]

This volume consists of a collection of travels in various parts of the East, principally undertaken in 1870-71, but supplemented by information and impressions received during a second journey made between 1876-78. The opening chapters are mainly devoted to India and Ceylon, followed by others dealing with the Straits Settlements, Java, Sumatra, Siam, Japan, and the United States of North America. The volume deals largely with Botany, illustrated by coloured plates, it also contains two maps, one of the Indian Ocean, showing the flow of pumice-stone released by the earthquake of Krakatau, the other showing the author's route in Southern Asia.

Gowing, Lionel F.—*Five Thousand Miles in a Sledge*. With 31 illustrations by C. J. Uren, and a map. London, Chatto & Windus, 1889: crown 8vo., pp. xix. and 257. Price 8s. [Presented by the Publishers.]

A record of a journey in midwinter (1886-7) across Siberia, from Vladivostok, by Khabarovka, Blagovestchensk, Albazin, Stretensk, Verkhne Udiusk, the Baikal, Irkutsk, Tomsk, and Tiumen to Moscow.

Marvin, Charles.—*The Petroleum Question*. Our Unappreciated Petroleum Empire; Oil discoveries in the Colonies. London, R. Anderson & Co. [1889]: 8vo., pp. 32, maps. Price 1s.

Ramos-Coelho, José.—*Historia do Infante D. Duarte irmão de el-rei D. João IV.* Tomo I. Lisboa, 1889: 8vo., pp. xxi. and 740, plates. [Presented by the Royal Academy of Sciences of Lisbon.]

Vincent, Benjamin.—*Haydn's Dictionary of Dates and Universal Information*. Nineteenth edition, containing the History of the World to the Autumn of 1889. London, Ward, Lock & Co., 1889: 8vo., pp. vi. and 1052. Price 18s.

The utility of this work has been long acknowledged, and its general accuracy admitted. Mr. Vincent, however, might have attained still greater accuracy had he submitted certain sections for revision to special authorities. Under Africa, for example, we find such entries as these:—"Italian expedition under Marchese Antinore well received by King of Seida." "Expedition by Mr. J. T. Last supported by the Royal Geographical Society to S. W. Zanzibar." "Alleged Massacre of Colonel Flatters' party (*American*) by Touaregs, 16 February, 1881." "The Imperial British East Africa Company supported by Mr. Wm. Mackenzie. . . large territories conceded to Mr. W. Mackenzie." Has not Mr. Vincent heard of Sir William Mackinnon, Bart.?

The following works have also been added to the Library:—

Butts, [Lieut.] de—*Rambles in Ceylon*. London, W. H. Allen & Co., 1841: 8vo., pp. xii. and 296.

Lee, [Lieut.] S. P.—*Report and Charts of the Cruise of the U.S. Brig Dolphin*, made under direction of the Navy Department. Washington, 1854: 8vo., pp. vii. and 331.

Smyth, [Prof.] C. Piazza.—*Three Cities in Russia*. 2 vols. London, Lovell 3 x 2

Reeve & Co., 1862: 8vo., pp. (vol. i.) xiv. and 499, (vol. ii.) iv. and 546, maps, plans, and illustrations.

[The above three works were presented by the Director of Military Intelligence, War Office.]

[Pallas].—Second Voyage de Pallas, ou voyages entrepris dans les Gouvernemens Méridionaux de l'Empire de Russie, pendant les années 1793 et 1794; par M. le Professeur Pallas; traduit de l'allemand par MM. de la Boulaye et Tonnelier. Paris, L. M. Guillaume & Deterville, 1811: 4 vols., 8vo, plates, and atlas 4to, pp. (vol. i.) xvi. and 372, (vol. ii.) 383, (vol. iii.) 387, (vol. iv.) 376.

Stewart, C. S.—A Visit to the South Seas, in the United States' Ship *Vincennes*, during the years 1829 and 1830; including scenes in Brazil, Peru, Manilla, the Cape of Good Hope, and St. Helena. 2 vols. London, H. Colburn and R. Bentley, 1832: 8vo., pp. (vol. i.) xxii. and 334, (vol. ii.) xii. and 358, plates.

NEW MAPS.

(By J. COLES, *Map Owrator R.O.S.*)

EUROPE.

Deutschen-Reiches.—Karte des ——. Scale 1:100,000, or 1·3 geographical miles to an inch. Sheets:—64, Bergen a. Rügen. 375, Krotoschin. 491, Lobenstein. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme. 1889. Price 1s. 6d. each sheet. (*Dulau.*)

Karwendel-Gebirges.—Spezialkarte von ——. Herausgegeben vom deutschen und oesterreichischen Alpenverein. Scale 1:50,000, or 1·4 inches to a geographical mile. München. Price 4s. (*Dulau.*)

Oesterreichisch-Ungarischen Monarchie.—Spezialkarte der ——. Scale 1:75,000, or 1 geographical mile to an inch. K. k. militär-geografisches Institut, Wien. Sheets:—Zone 27, Col. XV. Vrhpolje und Petrovac; 26—XVIII. Derwent und Kotorako; 27—XVII. Varoš und Teslić; 27—XIX. Dl. Tuzla; 28—XVI. Dragoraj und Jajce; 29—XIX. Kladanj und Čevljanovic; 29—XX. Vlasenica und Srebrenica. Price 1s. 4d. each sheet. (*Dulau.*)

Schwedens u. Norwegens.—Karte über die Eisenbahnen —, von John Lundberg. Scale 1:1,000,000, or 13·6 geographical miles to an inch. 2 sheets. Stockholm, Wahlström and Widstrand. Price 1l. 7s. mounted. (*Dulau.*)

Serbien.—Topographische Karte des Königreich —, herausgegeben vom Königlich. serb. grossen Generalstab. Scale 1:75,000, or 1 geographical mile to an inch. Sheets:—D. 1, Belgrad, 2, Avala, 3, Sopot, 4, Aranjelovac, 7, Studenice; E. 3, Palanka, 4, Racs, 5, Kragujevac, 6, Cukojevaca, 9, Pilatovica; G. 7, Ivackea, 8, Goljaplanina; I. 5, Banja Breslov, 6, Boljevac, 8, Niš, 9, Leskovač, Veternica, 11, Vrnja; J. 5, Zaječar, 6, Novihan, 8, Bela-Palanka, 10, Vlasolinec, 11, Vlasinja, 12, Babina-Poljana; K. 5, Rajač, 10, Dasuani-Kledemac; S. 5, Jagodina, 9, Kuršumije, 10, Poduljove; Z. 5, Rabanica Man. Price 1s. 6d. each sheet. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of October 1889.

1-inch—General Maps:—

ENGLAND AND WALES: New Series. Sheets 79, 189, 191 (in outline); 1s. each.
SCOTLAND: Sheet 44 (hill-shaded); 1s. 9d.

6-inch—County Maps:—

ENGLAND AND WALES: Carmarthenshire: 53 N.E.; 1s. Devonshire: 109 S.E.; 1s.
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AFRICA.

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A new and extended edition of this map could hardly have appeared at a more opportune time than the present, when so much attention is directed to the region it includes in consequence of the recent annexation by Portugal of about 28,000 square miles of the Mashona and Matabelé country within the sphere of "British influence," and recently granted by charter to the South Africa Company. The map has been carefully corrected, and exhibits the present status as regards the spheres of influence of European powers south of the Zambesi. In the Cape Colony the boundaries of the several districts are clearly shown, and all means of communication are laid down.

AMERICA AND THE WEST INDIES.

Jamaica.—Map of —, prepared from the best authorities by order of His Excellency Sir Henry Wylie Norman, G.C.B., G.C.M.G., C.I.E., Captain-General and Governor-in-Chief, 1888. Scale, 1:178,000 or 2·4 geographical miles to an inch. Prepared in the Public Works Department by Colin Liddell, Acting Government Surveyor, Kingston, Jamaica. Stanford's Geographical Establishment, London.

This map has been prepared in the Public Works Department, Kingston, Jamaica, by Mr. Colin Liddell, Acting Government Surveyor, and contains an

amount of detail not to be found on any other map of Jamaica. The topographical features are clearly indicated, the boundaries of counties and parishes are laid down, all means of communication are shown, and the importance of towns, roads, &c., is represented by symbols.

Patagonia.—Expedition a —, por orden del Museo Nacional de Buenos Aires. Mapa Itinerario levantado y dibujado por Carlos V. Burmeister, 1889. Scale 1: 1,150,000 or 15·7 geographical miles to an inch. *Anales del Museo Nacional de Buenos Aires*, tom. iii. plate v.

The country included in this map extends from the Chubut river to the fiftieth degree of south latitude, and from the coast to the seventieth degree of west longitude. As the expedition only made a route survey, the topographical features of the country within a short distance of the line of march is all that is shown, and even these to a very limited extent.

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in September and October 1889.

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No. 1807. England, east coast :—North Foreland to the Nore. 1975. England, east coast :—Kentish Knock and the Naze to West Swin. 160. Italy, west coast :—Civita Vecchia to Policastro. 274. North Polar chart :—Atlantic side. 287. Borneo :—Gaya bay to Sandakan harbour. 2576. Sulu Sea :—Sulu archipelago. 1423. New Zealand, North island :—Port Nicholson.

(J. D. Potter Agent.)

Hachette et Cie.—Atlas de Géographie Moderne, édité par Hachette et Cie. Ouvrage contenant 64 Cartes en couleur, accompagnées d'une Texte Géographique,

Statistique et Ethnographique, et un grand nombre de Cartes de Détail, Figures, Diagrammes, etc., par F. Schrader, F. Prudent et E. Anthonie. Paris, Librairie Hachette et Cie, 1889. 6^e Livraison. Price 10*s*. (*Dulau*.)

The present issue of this atlas contains physical and political maps of North America, and separate maps, on a larger scale, of the eastern and western portions of the United States. There is the usual amount of letterpress, illustrated by numerous diagrams.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von —. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Siebzehnte (17) Lieferung. Inhalt: No. 37, Britische Inseln, Übersicht in 1: 3,700,000, von A. Petermann. No. 74, West-Australien in 1: 5,000,000, von A. Petermann. No. 87, Vereinigte Staaten, Blatt 5 in 1: 3,700,000 von A. Petermann. Gotha, Justus Perthes, 1889. Price 1*s*. 6*d*. (*Dulau*.)

Sheet No. 87 is a map of the British Isles, on which inset maps of the Isle of Wight and Heligoland, and plans of London and the country round the Crystal Palace are given. Sheet No. 74 contains maps of Western Australia, Tasmania, New Zealand, and the Isthmus of Auckland. Sheet No. 87 is a portion of the six-sheet map of the United States, and contains the States Kansas, Missouri, Arkansas, Mississippi, Louisiana, Texas, parts of Colorado, New Mexico, and the Indian Territory.

PHOTOGRAPHS.

France.—Thirty-seven photographs of the Department of Ardèche, taken by Mons. James Jackson, September 1889. [Presented by Mons. James Jackson, Paris.]

This is a very fine series of photographs, illustrating the scenery of the Department of Ardèche.

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